



Product Selector Guide

Complete Catalog of Products and Publications
Eighth Edition

Advanced
Micro
Devices





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About The Cover

Think of Advanced Micro Devices as three different businesses – AMD 1, AMD 2, and AMD 3 – each with characteristics as distinct as the three primary colors. A skillful blending of these elements results in an enterprise that is focused, balanced and successful.

AMD 1 is our personal computer products business which offers you our X86 microprocessors, including our Am386® and Am486™ devices, and related peripherals. These products manufactured with advanced submicron CMOS processes, feature the highest speeds in the industry.

AMD 2 is our applications solutions business consisting of I/O, networking, communication, and embedded processor products. Here, we offer such products as our award winning PCnet™ family of single-chip Ethernet controller solutions and our 29K family of 32-bit RISC-based microprocessors.

AMD 3 consists of EPROMs, flash memories, PLDs, and standard products. Working with our Submicron Development Center, a 0.85-micron process for 12-volt and 5-volt flash devices was developed, and work continues on 0.5-micron and 0.35-micron processes for logic, flash memory and high-density programmable logic.

AMD is a world leader in innovative designs, process technology and important relationships with customers. Our product offerings will help you gain and keep the competitive edge.

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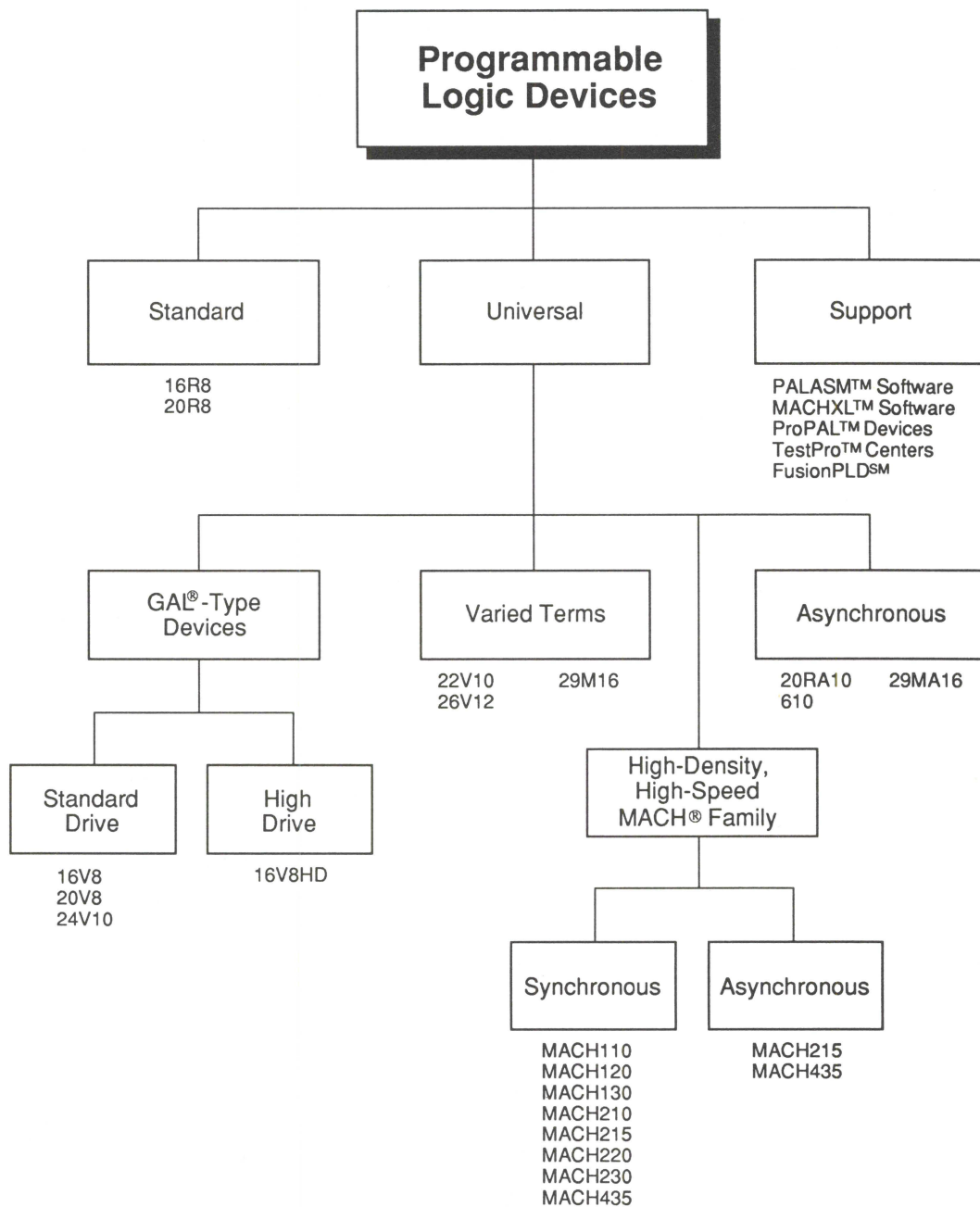
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PROGRAMMABLE **L**OGIC **D**EVICES

Programmable Logic Devices



Introduction

Advanced Micro Devices has developed more solutions than anyone else for getting you to market faster with programmable logic. AMD offers the broadest and best supported line of programmable logic devices in the industry, and we sell more PAL® devices than all our competitors combined.

We have universal CMOS EE PAL devices that can directly replace standard bipolar devices at one-quarter or one-half the power consumption. These include the 16V8 and 20V8 GAL-type devices, and the 22V10. All offered as fast as 5-ns in low-power CMOS technology. The new MACH® Family extends this high speed to 5000 gates.

And we have the fastest bipolar TTL logic of any kind in our 5-ns families, the 16R8 Series and the 20R8 Series, and the 4.5-ns 16R8 Series. This speed allows you to improve on the speed of even the fastest discrete logic solutions while integrating chips and saving board space.

AMD's programmable logic devices are supported by a number of qualified software tools and programmers. AMD itself offers PALASM® design software. PALASM software takes the designer's logic description and allows verification and reduction of the logic, and conversion to a programming file.

ProPAL™ devices are PAL devices that are programmed, marked and functionally tested by AMD. High quality levels provide significant benefits in manufacturing cost savings.

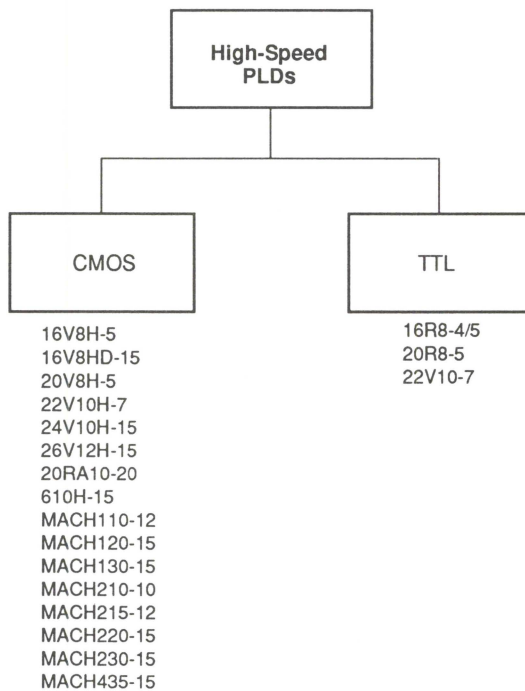
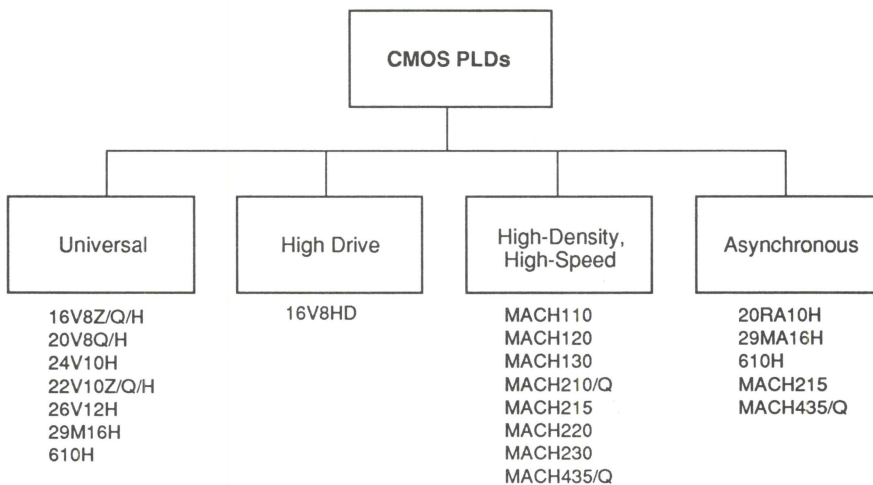
TestPro™ Centers are distributor-based programming and test facilities. These centers represent a synthesis of the techniques and expertise in programming, testing, and handling that have become our mainstay in supplying thousands of customers with tens of millions of superior devices.

Features of PLDs

- Easy-to-use programmable logic devices provide instant custom logic
- Speed design, save board space, increase reliability, lower costs
- Improve time-to-market dramatically
- Wide range of density with PAL and MACH devices
- Advanced PALASM software allows Boolean or state equations for design entry
- Distributor-based TestPro Centers for volume programming, test, and marking

Advantages of AMD PLDs

- Widest selection and best support from the leader in programmable logic
- Highest-speed bipolar PAL devices provide fastest logic type
- Low-power and zero-standby power Universal EE CMOS PAL devices
- MACH family provides breakthrough combination of speed and density
- Advanced PAL device and MACH device architectures for complex logic
- Industry-leading quality
- Supported by widest variety of third-party software, programming, and test tools



Universal PAL Devices

Family	Part Number*	Package	Technology	I/Ps	I/Os	PTs Per O/P	Features	Com'l		Mil		I _{CC} * mA			
								t _{PD} ns	f _{MAX} MHz	t _{PD} ns	f _{MAX} MHz				
16V8	PALCE16V8H-5	20S, J	EE CMOS	8	8	8	GAL [®] Device Equivalent	5	142.8	—	—	125			
	PALCE16V8H-7	20P, J						7.5	100	—	—	115			
	PALCE16V8H-10	20P, S, J						10	66.7	15	41.6	115			
	PALCE16V8Q-10							10	66.7	—	—	55			
	PALCE16V8H-15							15	45.5	20	33.3	90			
	PALCE16V8Q-15	20P, J						15	45.5	—	—	55			
	PALCE16V8H-25	20P, S, J						25	37	25	28.6	90			
	PALCE16V8Q-25	20P, J						25	37	—	—	55			
	PALCE16V8Z-15	20P, J					Zero-Power	15	45.5	—	—	0.015			
	PALCE16V8Z-25							25	33.3	—	—	0.015			
	PALLV16V8Z-25	20P, J					3.3 V Zero-Power	25	33.3	—	—	0.015			
	PALLV16V8Z-30							30	22	—	—	0.015			
	PALLV16V8-10	20P, J					3.3 V	10	55.5	—	—	115			
	PALCE16VHD-15	24P, 28J					High-Drive	15	50	—	—	115			
20V8	PALCE20V8H-5	24S, 28J		12	8	8	GAL Device Equivalent	5	142.8	—	—	125			
	PALCE20V8H-7							7.5	100	—	—	115			
	PALCE20V8H-10	24P, S, 28J						10	66.7	15	41.6	115			
	PALCE20V8Q-10							10	66.7	—	—	55			
	PALCE20V8H-15							15	45.5	20	33.3	90			
	PALCE20V8Q-15	24P, 28J						15	45.5	—	—	55			
	PALCE20V8H-25							25	37	25	25	90			
	PALCE20V8Q-25							25	37	—	—	55			
22V10	PAL22V10-7	24P, 28J	TTL	12	10	8-16	Varied Term Distribution	7.5	91	—	—	220			
	PAL22V10-10							10	71	12	50	180			
	PAL22V10-15							15	50	20	31.2	180			
	AmPAL22V10A							25	28.5	30	22	180			
	PALCE22V10H-5	28J	EE CMOS				Varied Term Distribution	5	142.8	—	—	115			
	PALCE22V10H-7	24P, S, 28J						7.5	100	—	—	115			
	PALCE22V10H-10							10	83.3	15	50	120			
	PALCE22V10Q-10	24P, 28J						10	83.3	—	—	55			
	PALCE22V10H-15	24P, S, 28J						15	50	20	33.3	90			
	PALCE22V10Q-15							15	50	—	—	55			
	PALCE22V10H-25	24P, S, 28J						25	33.3	25	26.3	90			
	PALCE22V10Q-25							25	33.3	—	—	55			
	PALCE22V10Z-15	24P, S, 28J					Zero Power	15	50	—	—	0.015			
	PALCE22V10Z-25							25	33.3	—	—	0.015			
	PALLV22V10Z-25	24P, S, 28J					3.3 V Zero-Power	25	33.3	—	—	0.015			
24V10	PALCE24V10H-15	28P, J					14	10	8	28-Pin	15	45.5	—	—	115
	PALCE24V10H-25									GAL-Type	25	37	—	—	115
26V12	PALCE26V12H-15	28P, J					14	12	8-16	Advanced	15	50	—	—	105
	PALCE26V12H-20									22V10 Macrocell	20	40	—	—	105
29M16	PALCE29M16H-25	24P, 28J					5	16	8-16	Advanced Macrocell	25	28.5	—	—	100

ASYNCHRONOUS PAL DEVICES

Family	Part Number*	Package	Technology	I/Ps	I/Os	PTs Per O/P	Features	Com'l		Mil		I _{CC} * mA
								t _{PD} ns	f _{MAX} MHz	t _{PD} ns	f _{MAX} MHz	
610	PALCE610H-15	24P, 28J	EE CMOS	4	16	8	J-K F/Fs, Prog. CLK	15	45.5	20	35.8	90
	PALCE610H-25							25	37	—	—	90
20RA10	PALCE20RA10H-20	24P, 28J		10	10	4	Prog. CLK	20	37	—	—	100
29MA16	PALCE29MA16H-25	24P, 28J		5	16	4-12	Prog. CLK, Advanced Macrocell	25	28.5	—	—	100

Standard PAL Devices

Family	Part Number*	Package	Technology	I/Ps	I/Os	O/Ps	PTs Per O/P	Com'l		Mil		I _{CC} * mA
								t _{PD} ns	f _{MAX} MHz	t _{PD} ns	f _{MAX} MHz	
16R8	PAL16L8-4 PAL16R8-4 PAL16R6-4 PAL16R4-4	28J	TTL	10 8 8 8	6 Comb — 2 Comb 4 Comb	2 Comb 8 Reg 6 Reg 4 Reg	7 8 7,8 7,8	4.5	125	—	—	210
	PAL16L8-5 PAL16R8-5 PAL16R6-5 PAL16R4-5	20P, J						5	117	—	—	210
	PAL16L8-7 PAL16R8-7 PAL16R6-7 PAL16R4-7	20P, J, D						7.5	74	10 12	52.6 47.6	180
	PAL16L8D/2 PAL16R8D/2 PAL16R6D/2 PAL16R4D/2	20P, J						10	58.8	—	—	180
	PAL16L8B PAL16R8B PAL16R6B PAL16R4B	20N, J, NL						15	37	20	28.5	180
	PAL16L8B-2 PAL16R8B-2 PAL16R6B-2 PAL16R4B-2							25	25	30	20	90
	PAL16L8A PAL16R8A PAL16R6A PAL16R4A							25	25	30	20	180
	PAL16L8B-4 PAL16R8B-4 PAL16R6B-4 PAL16R4B-4							35	16	50	13.3	55
20R8	PAL20L8-5 PAL20R8-5 PAL20R6-5 PAL20R4-5	24P, 28J	14 12 12 12	6 Comb — 2 Comb 4 Comb	2 Comb 8 Reg 6 Reg 4 Reg	7 8 7,8 7,8	5	117	—	—	210	
	PAL20L8-7 PAL20R8-7 PAL20R6-7 PAL20R4-7	24P, 28J, 24D					7.5	74	10 12	50 41.7	210	
	PAL20L8-10/2 PAL20R8-10/2 PAL20R6-10/2 PAL20R4-10/2	24P, 28J					10	55.5	—	—	210	
	PAL20L8B PAL20R8B PAL20R6B PAL20R4B	24NS, 28NL, 24JS,					15	37	20	28.5	210	
	PAL20L8B-2 PAL20R8B-2 PAL20R6B-2 PAL20R4B-2						25	25	—	—	105	
	PAL20L8A PAL20R8A PAL20R6A PAL20R4A						25	25	30	20	210	
18P8	AmPAL18P8B AmPAL18P8AL AmPAL18P8A AmPAL18P8L	20P, J	10	8	8	8	15 25 25 35	—	—	—	180 90 180 90	
22P10	AmPAL22P10B AmPAL22P10AL AmPAL22P10A	24P, 28J					12	10	10	8	15 25 25	—

MACH (Macro Array CMOS High-density) Family

Family	Part Number*	Package	Technology	I/Ps	I/Os	Buried Cells	PTs Per O/P	Com'l		Mil		I _{CC} * mA
								t _{PD} ns	f _{MAX} MHz	t _{PD} ns	f _{MAX} MHz	
MACH 1	MACH110-12	44J, 44CQFP	EE CMOS	6	32	—	0-12	12	67	—	—	150
	MACH110-15							15	50	—	—	150
	MACH110-20							20	40	20	40	150
	MACH120-15	68J		8	48			15	50	—	—	180
	MACH120-20							20	40			180
	MACH130-15	84J, 84CQFP		6	64			15	50	—	—	180
	MACH130-20							20	40	20	40	180
MACH 2	MACH210A-10	44J, 44CQFP		6	32	32	0-16	10	80	—	—	180
	MACH210-12							12	67	—	—	180
	MACH210-15							15	50	—	—	180
	MACH210AQ-15							15	15	—	—	55
	MACH210-20							20	40	20	40	180
	MACH210AQ-20							20	20	—	—	55
	MACH220-12	68J		8	48	48		12	67	—	—	300
	MACH220-15							15	50	—	—	300
	MACH220-20							20	40			300
	MACH230-15	84J		6	64	64		15	50	—	—	360
	MACH230-20							20	40			360
MACH 2 Sync/Async	MACH215-12	44J		6	32	32 Input Cells	0-12	12	67	—	—	180
	MACH215-15							15	50			180
	MACH215-20							20	40			180
MACH 4	MACH435-15	84J		6	64	64 Buried and 64 Input Cells	0-20	15	50	—	—	400
	MACH435-20							20	40			400
	MACH435Q-25							25	31.3			130

PACKAGE DESIGNATORS/MARKERS

AMD	MMI	Package	AMD	MMI	Package
P	N	Plastic DIP	—	NL	PLCC-28-pin non-JEDEC
P	NS	Plastic SKINNYDIP®	J	FN	PLCC-28-pin JEDEC
R	—	Plastic SKINNYDIP Option	J	—	PLCC-44-pin
R	J	Ceramic DIP	K	W	Ceramic Flatpack
L	JS	Ceramic SKINNYDIP	CQFP	—	Metal-Lid Ceramic Quad Flatpack
S	—	Small-Outline (SOIC)	2	L	20-Pin Ceramic Leadless
J	NL	PLCC-20-pin			Chip Carrier
			3	L	28-Pin Ceramic Leadless
					Chip Carrier

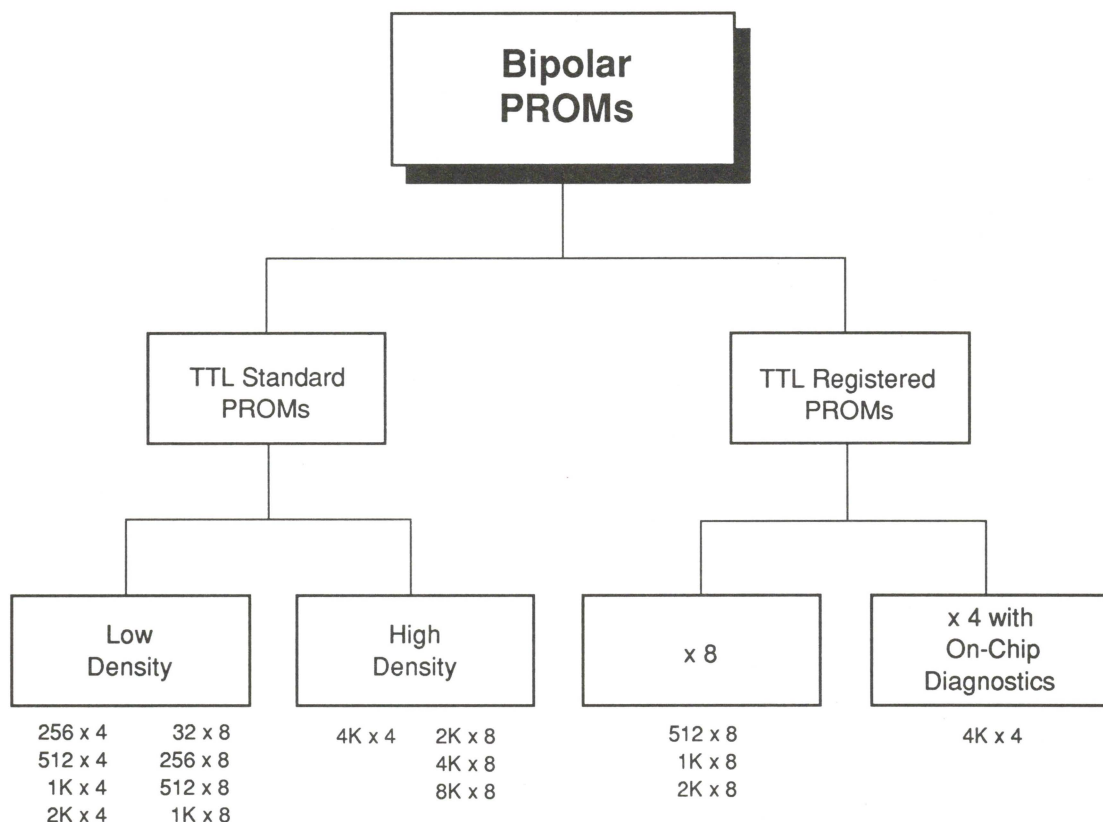
Part Numbers in **BOLD** print = New products planned for upcoming release. Contact AMD for latest information.

* Part names and I_{CC} specifications are for commercial grade and may not necessarily apply to military grade. Contact AMD for complete specifications.

"MMI marked" devices are those that have an MMI logo marking and were produced by Monolithic Memories, Inc. before the companies merged.

MEMORY PRODUCTS

Bipolar PROMs



Advantages of AMD PROM Devices

- Broadest Bipolar PROM product line in the industry (1/4K to 64K)
- AMD's IMOX™ process produces the industry's fastest bipolar PROMs
- Highly reliable, ultra-fast programming platinum-silicide fuses guarantees extremely high (>98%) programming yields for Am27Sxxx Series

Features and Benefits

- Low voltage generic programming
- PNP inputs for low input current
- Three-state outputs
- Registered output options
- Many are offered in 300-mil SKINNYDIP® package
- Some are offered in power-switched version

Typical applications include:

- Microprogramming controls
- State machines
- Mapping functions
- Code conversion
- Character generator
- Next address generation
- Look-up table
- Logic replacement

TTL Standard PROMs

Part Number	Size	Organization	Output	Pin Count	Access Times T _{AA} C/M ¹ Max	Package Type ³
Am27LS19	256	32 x 8	TS	16	55/70	D, P, F, L
Am27S19	256	32 x 8	TS	16	40/50	D, P, F, L, J
Am27S19A	256	32 x 8	TS	16	25/35	D, P, F, L, J
Am27S19SA	256	32 x 8	TS	16	15/20	D, P, F, L, J
Am27S21	1024	256 x 4	TS	16	45/60	D, P, F, L, J
Am27S21A	1024	256 x 4	TS	16	30/40	D, P, F, L, J
Am27S23	2048	256 x 8	TS	20	45/50	N, NL, W, L, J
Am27S23A	2048	256 x 8	TS	20	28/40	N, NL, W, L, J
Am27S13	2048	512 x 4	TS	16	50/60	D, P, F, L, J
Am27S13A	2048	512 x 4	TS	16	30/40	D, P, F, L, J
Am27S29	4096	512 x 8	TS	20	55/70	D, P, F, L, J
Am27S29A	4096	512 x 8	TS	20	40/50	D, P, F, L, J
Am27S29SA	4096	512 x 8	TS	20	30/40	D, P, F, L, J
Am27S31	4096	512 x 8	TS	24	55/70	D, P, F, L
Am27S31A	4096	512 x 8	TS	24	40/50	D, P, F, L
Am27S33	4096	1024 x 4	TS	18	55/70	D, P, F, L, J
Am27S33A	4096	1024 x 4	TS	18	35/45	D, P, F, L, J
Am27S181	8192	1024 x 8	TS	24	60/80	D, P, F, L, J
Am27S181A	8192	1024 x 8	TS	24	35/50	D, P, F, L, J
Am27S281 ²	8192	1024 x 8	TS	24	60/80	D, P
Am27S281A ²	8192	1024 x 8	TS	24	35/50	D, P
Am27S185	8192	2048 x 4	TS	18	50/55	D, P, F, L, J
Am27S185A	8192	2048 x 4	TS	18	35/45	D, P, F, L, J
Am27S191	16384	2048 x 8	TS	24	50/65	D, P, F, L, J
Am27S191A	16384	2048 x 8	TS	24	35/50	D, P, F, L, J
Am27S191SA	16384	2048 x 8	TS	24	25/30	D, P, F, L, J
Am27PS191	16384	2048 x 8	TS	24	65/75	D, P, F, L, J
Am27PS191A	16384	2048 x 8	TS	24	50/65	D, P, F, L, J
Am27S291 ²	16384	2048 x 8	TS	24	50/65	D, P
Am27S291A ²	16384	2048 x 8	TS	24	35/50	D, P
Am27S291SA ²	16384	2048 x 8	TS	24	25/30	D, P
Am27PS291 ²	16384	2048 x 8	TS	24	65/75	D, P
Am27PS291A ²	16384	2048 x 8	TS	24	50/65	D, P
Am27S41	16384	4096 x 4	TS	20	50/65	D, P
Am27S41A	16384	4096 x 4	TS	20	35/50	D, P
Am27PS41	16384	4096 x 4	TS	20	—/65	D
Am27S43	32768	4096 x 8	TS	24	55/65	D, P, F, L
Am27S43A	32768	4096 x 8	TS	24	40/55	D, P, F, L
Am27S49	65536	8192 x 8	TS	24	55/65	D, F, L
Am27S49A-45	65636	8192 x 8	TS	24	45/—	D
Am27S49A	65536	8192 x 8	TS	24	40/55	D, F, L

TTL Registered PROMs

Part Number	Size	Organization	Output	Pin Count	Set-Up Times C/M' Max	Clock To Output Times C/M' Max	Package Type ^a
Am27S25 ²	4096	512 x 8	TS	24	50/55	27/30	D, P, F, L, J
Am27S25A ²	4096	512 x 8	TS	24	30/35	20/25	D, P, F, L, J
Am27S25SA ²	4096	512 x 8	TS	24	25/30	12/15	D, P, F, L, J
Am27S27	4096	512 x 8	TS	22	55/65	27/30	D, F
Am27S27A	4096	512 x 8	TS	22	30/35	15/20	D, F
Am27S35 ²	8192	1024 x 8	TS	24	40/45	25/30	D, P, F, L, J
Am27S35A ²	8192	1024 x 8	TS	24	35/40	20/25	D, P, F, L, J
Am27S37 ²	8192	1024 x 8	TS	24	40/45	25/30	D, P, F, L, J
Am27S37A ²	8192	1024 x 8	TS	24	35/40	20/25	D, P, F, L, J
Am27S45 ²	16384	2048 x 8	TS	24	45/50	25/30	D, P, F, L, J
Am27S45A ²	16384	2048 x 8	TS	24	40/45	20/25	D, P, F, L, J
Am27S45SA ²	16384	2048 x 8	TS	24	25/28	10/12	D, P, F, L, J
Am27S47 ²	16384	2048 x 8	TS	24	45/50	25/30	D, P, F, L, J
Am27S47A ²	16384	2048 x 8	TS	24	40/45	20/25	D, P, L
Am27S47SA ²	16384	2048 x 8	TS	24	25/28	10/12	D, P, L

Registered PROMs with On-Chip Diagnostics

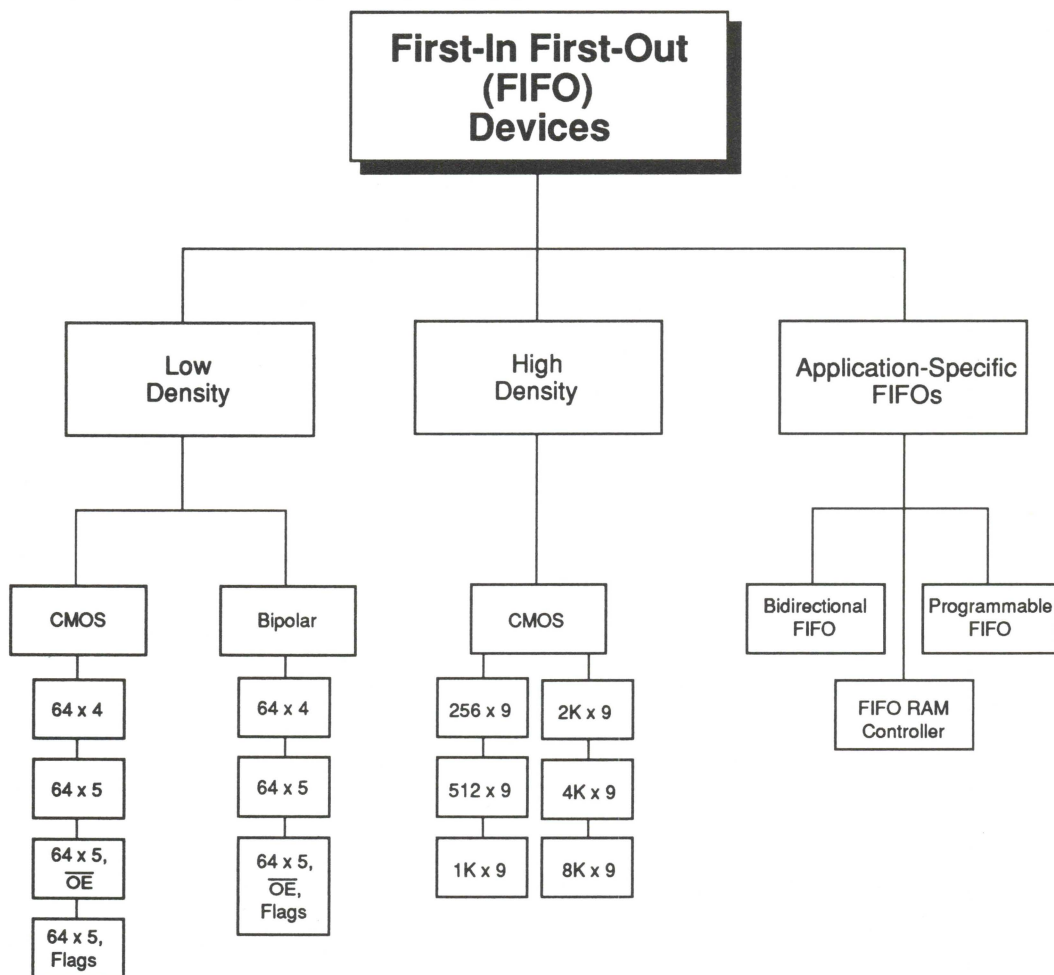
Part Number	Size	Organization	Output	Pin Count	Set-Up Times C/M' Max	Clock To Output Times C/M' Max	Package Type ^a
Am27S85 ²	16384	4096 x 4	TS	24	35/40	15/20	D, P, L
Am27S85A ²	16384	4096 x 4	TS	24	27/30	12/17	D, P, L

Notes:

- Commercial = 0°C to +75°C, $V_{CC} = 5\text{ V} \pm 5\%$.
Military = -55°C to +125°C, $V_{CC} = 5\text{ V} \pm 10\%$.
- SKINNYDIP 24-pin package—300 mil lateral centers.
TS = Tri-state
- Package Type
Am27SXXX Series

D = Ceramic DIP
 F = Ceramic Flat Pack
 L = Ceramic Leadless Chip Carrier
 J = Plastic Leaded Chip Carrier
 P = Plastic DIP

First-In First-Out Devices



Introduction

Advanced Micro Devices is committed to providing our customers with winning edge products. AMD is a pioneer in the field of unique specialty memory devices. Our extensive line of bipolar and CMOS FIFO buffer memories meets a wide variety of user applications needs.

Our FIFO devices offer high performance, innovative architectures and increased density. They contain the special features that you require for complex data-buffering system designs. The AMD FIFOs provide unique specialty memory solutions that give you the winning edge.

FIFOs are subdivided into the following categories: application-specific, high-density and low-density. Low-density FIFOs represent approximately 40 percent of the market, a clear indication of a trend toward high-density and application-specific FIFOs. These devices provide the special features and technology needed to meet increasingly complex data-buffering requirements.

Advanced Micro Devices provides the most comprehensive range of bipolar and CMOS FIFO buffer memories available today. Most of these FIFOs can be expanded in width and/or depth, so that you can tailor the overall rate adaption or temporary storage memory to your application.

Features and Benefits

Low Density CMOS FIFOs (64 x 4/5)

- Shift rates to 15 MHz
- Zero standby power consumption
- RAM-based technology with fast access times
- Three-state output and status flags
- Expandable in width and depth

High-Density CMOS FIFOs (256, 512, 1K, 2K, 4K, 8K x 9)

- Data Rates 0 to 40.0 MHz
- Low power consumption – 90 mA max at $t_{\text{A}}=15\text{ ns}$
- Status flags – Half-Full, Empty, Full
- Asynchronous and simultaneous read/write
- Expandable in width and depth

Low-Density FIFOs, Commercial

Technology	Part Number	Organization	Type	Max Data Rate MHz	Max I _{cc} mA	Package Type	Pin Count	Features
B	67401	64 x 4	S	10	160	N,J	16	TPO
B	C67401	64 x 4	C	10	160	N,J	16	TPO
B	67401A	64 x 4	S	15	170	N,J	16	TPO
B	C67401A	64 x 4	C	15	170	N,J	16	TPO
B	67402	64 x 5	S	10	180	N,J	18	TPO
B	C67402	64 x 5	C	10	180	N,J	18	TPO
B	67402A	64 x 5	S	15	190	N,J	18	TPO
B	C67402A	64 x 5	C	15	190	N,J	18	TPO
C	67C401-10	64 x 4	C	10	35	N	16	TPO Low Power, RAM Based
C	67C401-15	64 x 4	C	15	45	N	16	TPO Low Power, RAM Based
C	67C4013-10	64 x 4	C	10	35	N	16	TSO Low Power, RAM Based
C	67C4013-15	64 x 4	C	15	45	N	16	TSO Low Power, RAM Based
C	67C402-10	64 x 5	C	10	35	N	18	TPO Low Power, RAM Based
C	67C402-15	64 x 5	C	15	45	N	18	TPO Low Power, RAM Based
C	67C4023-10	64 x 5	C	10	35	N	18	TSO Low Power, RAM Based
C	67C4023-15	64 x 5	C	15	45	N	18	TSO Low Power, RAM Based
C	67C4033-10	64 x 5	C	10	35	N	20	TSO Low Power, RAM Based, Status Flags, $\overline{\text{OE}}$
C	67C4033-15	64 x 5	C	15	45	N	20	TSO Low Power, RAM Based, Status Flags, $\overline{\text{OE}}$

High-Density FIFOs, Commercial

Technology	Part Number	Organization	Type	Max Data Rate MHz	Max I _{cc} mA	Package Type	Pin Count	Features
C	7200-50	256 x 9	C	15.3	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 50 ns, Status Flags
C	7200-35	256 x 9	C	22.2	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 35 ns, Status Flags
C	7200-25	256 x 9	C	28.5	70	PC, JC, RC	28, 32 (JC)	TSO Access Time = 25 ns, Status Flags
C	7201-50	512 x 9	C	15.3	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 50 ns, Status Flags
C	7201-35	512 x 9	C	22.2	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 35 ns, Status Flags
C	7201-25	512 x 9	C	28.5	70	PC, JC, RC	28, 32 (JC)	TSO Access Time = 25 ns, Status Flags
C	7202A-50	1K x 9	C	15.3	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 50 ns, Status Flags
C	7202A-35	1K x 9	C	22.2	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 35 ns, Status Flags
C	7202A-25	1K x 9	C	28.5	70	PC, JC, RC	28, 32 (JC)	TSO Access Time = 25 ns, Status Flags
C	7202A-15	1K x 9	C	40.0	90	JC, RC	28, 32 (JC)	TSO Access Time = 15 ns, Status Flags
C	7203A-50	2K x 9	C	15.3	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 50 ns, Status Flags
C	7203A-35	2K x 9	C	22.2	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 35 ns, Status Flags
C	7203A-25	2K x 9	C	28.5	70	PC, JC, RC	28, 32 (JC)	TSO Access Time = 25 ns, Status Flags
C	7203A-15	2K x 9	C	40.0	90	JC, RC	28, 32 (JC)	TSO Access Time = 15 ns, Status Flags
C	7204A-50	4K x 9	C	15.3	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 50 ns, Status Flags
C	7204A-35	4K x 9	C	22.2	60	PC, JC, RC	28, 32 (JC)	TSO Access Time = 35 ns, Status Flags
C	7204A-25	4K x 9	C	28.5	70	PC, JC, RC	28, 32 (JC)	TSO Access Time = 25 ns, Status Flags
C	7204A-15	4K x 9	C	40.0	90	JC, RC	28, 32 (JC)	TSO Access Time = 15 ns, Status Flags
C	7205A-35	8K x 9	C	22.2	80	RC	28	TSO Access Time = 35 ns, Status Flags
C	7205A-25	8K x 9	C	28.5	90	RC	28	TSO Access Time = 25 ns, Status Flags
C	7205A-15	8K x 9	C	40.0	100	RC	28	TSO Access Time = 15 ns, Status Flags

Application-Specific FIFOs, Commercial

Technology	Part Number	Organization	Type	Max Data Rate MHz	Max I _{cc} mA	Package Type	Pin Count	Features
C	Am4701-35	Dual-512 x 8	S	22.2	120	PC, JC	28, 32 (JC)	TSO Access Time = 35 ns, Programmable Flags
C	Am4701-45	Dual-512 x 8	S	16.7	100	PC, JC	28, 32 (JC)	TSO Access Time = 45 ns, Programmable Flags
C	Am4601-25	512 x 9	S	28.5	90	RC, JC	28, 32 (JC)	TSO Access Time = 25 ns, Programmable Flags
C	Am4601-35	512 x 9	S	22.2	80	RC, JC	28, 32 (JC)	TSO Access Time = 35 ns, Programmable Flags

Low Density Bipolar Military FIFOs

Technology	Part Number	Organization	Type	Max Data Rate MHz	Max I_{CC} mA	Package Type	Pin Count	Features
B	C57401A	64 x 4	C	10	180	J, L	16, 20 (LCC)	TPO
B	57401A	64 x 4	S	10	180	J, L	16, 20 (LCC)	TPO

Notes:

Technology

- B = Bipolar
- C = CMOS

Type

- C = Cascadable

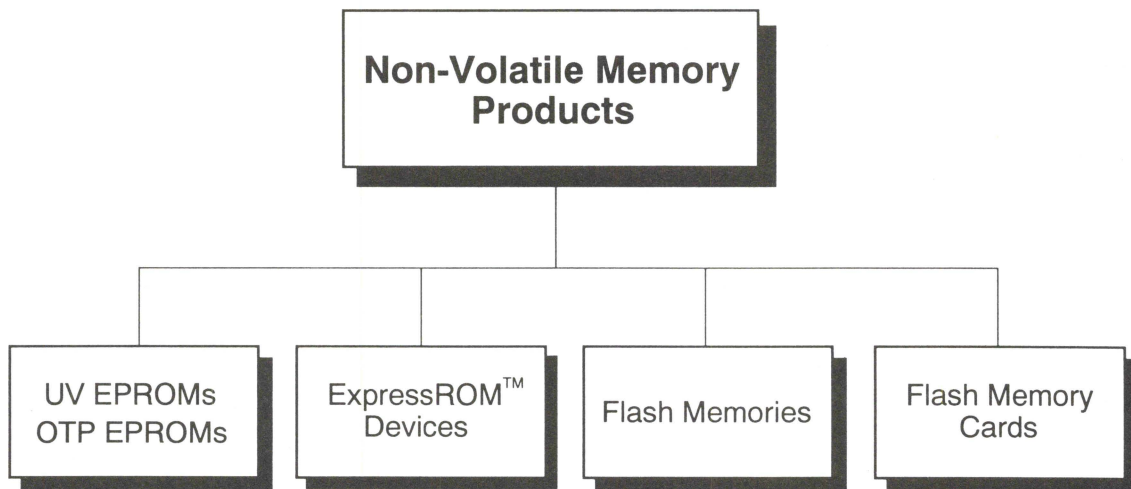
Package Type

- N = Plastic DIP
- RC = 300 mil Plastic DIP
- PC = 600 mil Plastic DIP
- J = 16 or 18-Pin Ceramic DIP
- JC = Plastic Leaded Chip Carrier

Features

- TSO = Three-State Output
- TSO = Totem-Pole Output

Non-Volatile Memory Products



Introduction

The Non-Volatile Memory Division manufactures a broad range of high performance memory products. Included are Flash memories, Flash memory cards, traditional windowed EPROMs, plastic OTP EPROMs and ExpressROM devices. These products offer the system designer an extensive choice of economical alternatives for program and data storage.

Flash Memories & Cards

Flash memories are the designers' choice for reprogrammable non-volatile memory in the 90's. AMD offers Flash devices with densities from 256K to 2 megabits, with higher densities available later in the year. The devices are available with AMD's Embedded Algorithms which guarantee a minimum of 100,000 write cycle endurance. The Embedded Algorithms also provide the lowest reprogramming failure rate in the industry.

AMD's innovative Am29Fxxx Flash product family eliminates the need for a dual power supply. This family of devices require only the standard 5 V supply for erase and program operations. These products provide additional features such as sector capability, sector protection and high performance. Today's devices are available in a byte-wide configuration. Future products are offered in both byte-wide and word-wide configurations.

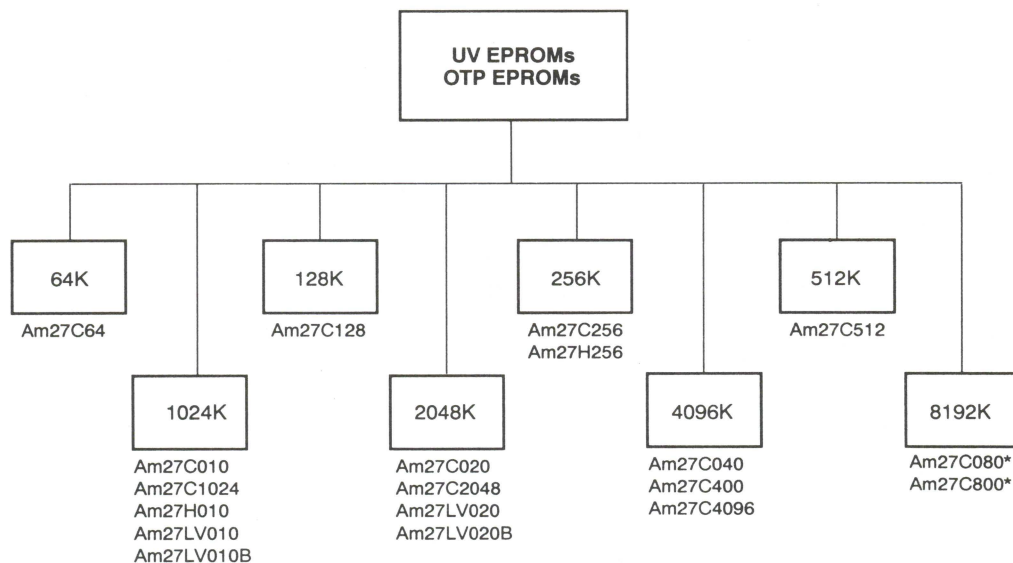
Rugged, low-power Flash memory cards offered in both 5 V-only and 5 V/12 V technologies are the ideal storage medium for applications such as hand-held and pen-tablet computers. Currently available in 1-, 2- and 4-megabyte densities, the cards feature Embedded Algorithms and a minimum of 100,000 write cycles for enhanced system performance and 10 times longer life than industry standard 10,000 cycle endurance cards.

EPROMs

AMD's EPROM offerings are manufactured using advanced CMOS process technology yielding access times as fast as 35 ns. Product densities range from 64K to 8 megabits. Designers challenged with extending useful battery life in portable applications will appreciate the 3 V EPROM product family. All EPROM products are offered in windowed ceramic and One-Time-Programmable (OTP) plastic packages.

A new concept from AMD is the ExpressROM device. These quick-turn ROMs, produced from EPROM wafers, are available with lead times typically half that of traditional ROMs.

AMD is committed to leadership in high-performance CMOS non-volatile memories. These products offer industry-leading speeds and densities that will contribute to the competitive advantages of your design.



UV EPROMs & OTP EPROMs

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage
Am27C64-45	8K x 8	45	C, I	D, L	28/32	5 V ± 10%
Am27C64-55	8K x 8	55	C, I	D, L	28/32	5 V ± 10%
Am27C64-70	8K x 8	70	C, I	D, L, P, J	28/32	5 V ± 10%
Am27C64-90	8K x 8	90	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C64-120	8K x 8	120	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C64-150	8K x 8	150	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C64-200	8K x 8	200	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C64-255	8K x 8	250	C, I	D, L, P, J	28/32	5 V ± 5%
Am27C128-45	16K x 8	45	C, I	D, L	28/32	5 V ± 10%
Am27C128-55	16K x 8	55	C, I	D, L	28/32	5 V ± 10%
Am27C128-70	16K x 8	70	C, I	D, L, P, J	28/32	5 V ± 10%
Am27C128-90	16K x 8	90	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C128-120	16K x 8	120	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C128-150	16K x 8	150	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C128-200	16K x 8	200	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C128-255	16K x 8	250	C, I	D, L, P, J	28/32	5 V ± 5%
Am27H256-35	32K x 8	35	C, I	D, L	28/32	5 V ± 10%
Am27H256-35V05	32K x 8	35	C, I	D, L	28/32	5 V ± 5%
Am27H256-45	32K x 8	45	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27H256-55	32K x 8	55	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27H256-70	32K x 8	70	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C256-55	32K x 8	55	C	D, L	28/32	5 V ± 5%
Am27C256-70	32K x 8	70	C	D, L	28/32	5 V ± 10%
Am27C256-90	32K x 8	90	C, I, E, M	D, L, P, J, E	28/32	5 V ± 10%
Am27C256-120	32K x 8	120	C, I, E, M	D, L, P, J, E	28/32	5 V ± 10%
Am27C256-150	32K x 8	150	C, I, E, M	D, L, P, J, E	28/32	5 V ± 10%
Am27C256-200	32K x 8	200	C, I, E, M	D, L, P, J, E	28/32	5 V ± 10%
Am27C256-250	32K x 8	250	M	D, L	28/32	5 V ± 10%
Am27C256-255	32K x 8	250	C, I	D, L, P, J	28/32	5 V ± 5%

Notes: see page 2-15

UV EPROMs & OTP EPROMs (Cont.)

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage
Am27C512-75	64K x 8	70	C, I	D, L	28/32	5 V ± 5%
Am27C512-90	64K x 8	90	C, I, E, M	D, L	28/32	5 V ± 10%
Am27C512-120	64K x 8	120	C, I, E, M	D, L	28/32	5 V ± 10%
Am27C512-150	64K x 8	150	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C512-200	64K x 8	200	C, I, E, M	D, L, P, J	28/32	5 V ± 10%
Am27C512-250	64K x 8	250	M	D, L	28/32	5 V ± 10%
Am27C512-255	64K x 8	250	C, I, E, M	D, L, P, J	28/32	5 V ± 5%
Am27H010-45	128K x 8	45	C, I	D, L	32/32	5 V ± 10%
Am27H010-45V05	128K x 8	45	C, I	D, L	32/32	5 V ± 5%
Am27H010-55	128K x 8	55	C, I, E, M	D, L, P, J	32/32	5 V ± 10%
Am27H010-70	128K x 8	70	C, I, E, M	D, L, P, J	32/32	5 V ± 10%
Am27H010-90	128K x 8	90	C, I, E, M	D, L, P, J	32/32	5 V ± 10%
Am27H010-90V05	128K x 8	90	C, I, E, M	D, L, P, J	32/32	5 V ± 5%
Am27C010-90	128K x 8	90	C, I	D, L, P, J, E	32/32	5 V ± 10%
Am27C010-95	128K x 8	90	C, I	D, L, P, J, E	32/32	5 V ± 5%
Am27C010-105	128K x 8	100	C, I	D, L	32/32	5 V ± 5%
Am27C010-120	128K x 8	120	C, I	D, L, P, J, E	32/32	5 V ± 10%
Am27C010-150	128K x 8	150	C, I, E, M	D, L, P, J, E	32/32	5 V ± 10%
Am27C010-200	128K x 8	200	C, I, E, M	D, L, P, J, E	32/32	5 V ± 10%
Am27C010-250	128K x 8	250	M	D, L	32/32	5 V ± 10%
Am27C010-255	128K x 8	250	C, I	D, L, P, J, E	32/32	5 V ± 5%
Am27LV010-120	128K x 8	120	C	D, L	32/32	3.3 V ± 10%
Am27LV010-150	128K x 8	150	C, I, E, M	D, L, J, E	32/32	3.3 V ± 10%
Am27LV010-200	128K x 8	200	C, I, E, M	D, L, J, E	32/32	3.3 V ± 10%
Am27LV010-250	128K x 8	250	C, I, E, M	D, L, J, E	32/32	3.3 V ± 10%
Am27LV010-300	128K x 8	300	C, I, E, M	D, L, J, E	32/32	3.3 V ± 10%
Am27LV010B-150	128K x 8	150	C, I	D, L, J, E	32/32	2.7 V – 3.6 V
Am27LV010B-200	128K x 8	200	C, I, E	D, L, J, E	32/32	2.7 V – 3.6 V
Am27LV010B-250	128K x 8	250	C, I, E, M	D, L, J, E	32/32	2.7 V – 3.6 V
Am27LV010B-300	128K x 8	300	C, I, E, M	D, L, J, E	32/32	2.7 V – 3.6 V
Am27C1024-85	64K x 16	85	C	D	40	5 V ± 5%
Am27C1024-90	64K x 16	90	C, I	D, L	40/44	5 V ± 10%
Am27C1024-120	64K x 16	120	C, I, E, M	D, L	40/44	5 V ± 10%
Am27C1024-150	64K x 16	150	C, I, E, M	D, L	40/44	5 V ± 10%
Am27C1024-200	64K x 16	200	C, I, E, M	D, L, P, J	40/44	5 V ± 10%
Am27C1024-250	64K x 16	250	M	D, L	40/44	5 V ± 10%
Am27C1024-255	64K x 16	250	C, I	D, L, P, J	40/44	5 V ± 5%
Am27C020-100	256K x 8	100	C	D, L	32/32	5 V ± 10%
Am27C020-120	256K x 8	120	C, I	D, L	32/32	5 V ± 10%
Am27C020-150	256K x 8	150	C, I, E, M	D, L, P, J	32/32	5 V ± 10%
Am27C020-200	256K x 8	200	C, I, E, M	D, L, P, J	32/32	5 V ± 10%
Am27C020-250	256K x 8	250	M	D, L	32/32	5 V ± 10%
Am27C020-255	256K x 8	250	C, I	D, L, P, J	32/32	5 V ± 5%
Am27LV020-150	256K x 8	150	C, I	D, L, J	32/32	3.3 V ± 10%
Am27LV020-200	256K x 8	200	C, I, E, M	D, L, J	32/32	3.3 V ± 10%
Am27LV020-250	256K x 8	250	C, I, E, M	D, L, J	32/32	3.3 V ± 10%
Am27LV020-300	256K x 8	300	C, I, E, M	D, L, J	32/32	3.3 V ± 10%
Am27LV020B-200	256K x 8	200	C, I, E	D, L, J	32/32	2.7 V – 3.6 V
Am27LV020B-250	256K x 8	250	C, I, E, M	D, L, J	32/32	2.7 V – 3.6 V
Am27LV020B-300	256K x 8	300	C, I, E, M	D, L, J	32/32	2.7 V – 3.6 V

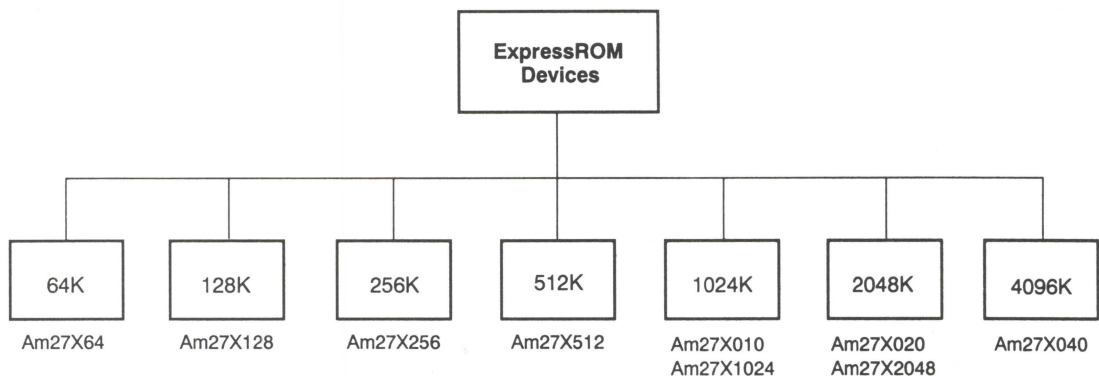
Notes: see page 2-15

UV EPROMs & OTP EPROMs (Cont.)

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage
Am27C2048-90	128K x 16	90	C	D, L	40/44	5 V \pm 10%
Am27C2048-95	128K x 16	90	C	D, L	40/44	5 V \pm 5%
Am27C2048-105*	128K x 16	100	C	D, L	40/44	5 V \pm 5%
Am27C2048-120	128K x 16	120	C, I	D, L	40/44	5 V \pm 10%
Am27C2048-150	128K x 16	150	C, I, E, M	D, L, P, J	40/44	5 V \pm 10%
Am27C2048-200	128K x 16	200	C, I, E, M	D, L, P, J	40/44	5 V \pm 10%
Am27C2048-250	128K x 16	250	M	D, L	40/44	5 V \pm 10%
Am27C2048-255	128K x 16	250	C, I	D, L, P, J	40/44	5 V \pm 5%
Am27C040-100	512K x 8	100	C	D, L	32/32	5 V \pm 10%
Am27C040-105	512K x 8	100	C, I	D, L	32/32	5 V \pm 10%
Am27C040-120	512K x 8	120	C, I	D, L, P, J	32/32	5 V \pm 10%
Am27C040-125	512K x 8	120	C, I	D, L, P, J	32/32	5 V \pm 5%
Am27C040-150	512K x 8	150	C, I, E, M	D, L, P, J	32/32	5 V \pm 10%
Am27C040-200	512K x 8	200	C, I, E, M	D, L, P, J	32/32	5 V \pm 10%
Am27C040-250	512K x 8	250	M	D, L	32/32	5 V \pm 10%
Am27C040-255	512K x 8	250	C, I	D, L, P, J	32/32	5 V \pm 5%
Am27C400-120	512K x 8/256K x 16	120	C, I	D	40	5 V \pm 10%
Am27C400-125	512K x 8/256K x 16	120	C, I	D	40	5 V \pm 5%
Am27C400-150	512K x 8/256K x 16	150	C, I	D	40	5 V \pm 10%
Am27C400-200	512K x 8/256K x 16	200	C, I	D	40	5 V \pm 10%
Am27C400-255	512K x 8/256K x 16	250	C, I	D	40	5 V \pm 5%
Am27C4096-120	256K x 16	120	C, I	D, L, P, J	40/44	5 V \pm 10%
Am27C4096-125	256K x 16	120	C, I	D, L, P, J	40/44	5 V \pm 5%
Am27C4096-150	256K x 16	150	C, I, E, M	D, L, P, J	40/44	5 V \pm 10%
Am27C4096-200	256K x 16	200	C, I, E, M	D, L, P, J	40/44	5 V \pm 10%
Am27C4096-250	256K x 16	250	M	D, L	40/44	5 V \pm 10%
Am27C4096-255	256K x 16	250	C, I	D, L, P, J	40/44	5 V \pm 5%
Am27C080-105*	1 Megabit x 8	100	C, I	D, L	32/32	5 V \pm 5%
Am27C080-120*	1 Megabit x 8	120	C, I	D, L	32/32	5 V \pm 10%
Am27C080-150*	1 Megabit x 8	150	C, I, E, M	D, L, P, J	32/32	5 V \pm 10%
Am27C080-200*	1 Megabit x 8	200	C, I, E, M	D, L, P, J	32/32	5 V \pm 10%
Am27C080-250*	1 Megabit x 8	250	M	D, L	32/32	5 V \pm 10%
Am27C080-255*	1 Megabit x 8	250	C, I	D, L, P, J	32/32	5 V \pm 5%
Am27C800-125*	1 Megabit x 8/512K x 16	120	C, I	D, L	42/44	5 V \pm 5%
Am27C800-120*	1 Megabit x 8/512K x 16	120	C, I	D, L	42/44	5 V \pm 10%
Am27C800-150*	1 Megabit x 8/512K x 16	150	C, I, E, M	D, L, P, J	42/44	5 V \pm 10%
Am27C800-200*	1 Megabit x 8/512K x 16	200	C, I, E, M	D, L, P, J	42/44	5 V \pm 10%
Am27C800-250*	1 Megabit x 8/512K x 16	250	M	D, L	42/44	5 V \pm 10%
Am27C800-255*	1 Megabit x 8/512K x 16	250	C, I	D, L, P, J	42/44	5 V \pm 5%

*Contact the local AMD sales office for the availability of this device.

Notes: see page 2-15

**ExpressROM Devices**

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage
Am27X64-90	8K x 8	90	C, I	P, J	28/32	5 V ± 10%
Am27X64-120	8K x 8	120	C, I	P, J	28/32	5 V ± 10%
Am27X64-150	8K x 8	150	C, I	P, J	28/32	5 V ± 10%
Am27X64-200	8K x 8	200	C, I	P, J	28/32	5 V ± 10%
Am27X64-255	8K x 8	250	C, I	P, J	28/32	5 V ± 5%
Am27X128-90	16K x 8	90	C, I	P, J	28/32	5 V ± 10%
Am27X128-120	16K x 8	120	C, I	P, J	28/32	5 V ± 10%
Am27X128-150	16K x 8	150	C, I	P, J	28/32	5 V ± 10%
Am27X128-200	16K x 8	200	C, I	P, J	28/32	5 V ± 10%
Am27X128-255	16K x 8	250	C, I	P, J	28/32	5 V ± 5%
Am27X256-90	32K x 8	90	C, I	P, J	28/32	5 V ± 10%
Am27X256-120	32K x 8	120	C, I	P, J	28/32	5 V ± 10%
Am27X256-150	32K x 8	150	C, I	P, J	28/32	5 V ± 10%
Am27X256-200	32K x 8	200	C, I	P, J	28/32	5 V ± 10%
Am27X256-255	32K x 8	250	C, I	P, J	28/32	5 V ± 5%
Am27XH256-45	32K x 8	45	C, I	P, J	28/32	5 V ± 10%
Am27XH256-55	32K x 8	55	C, I	P, J	28/32	5 V ± 10%
Am27XH256-70	32K x 8	70	C, I	P, J	28/32	5 V ± 10%
Am27X512-90	64K x 8	90	C, I	P, J	28/32	5 V ± 10%
Am27X512-120	64K x 8	120	C, I	P, J	28/32	5 V ± 10%
Am27X512-150	64K x 8	150	C, I	P, J	28/32	5 V ± 10%
Am27X512-200	64K x 8	200	C, I	P, J	28/32	5 V ± 10%
Am27X512-255	64K x 8	250	C, I	P, J	28/32	5 V ± 5%
Am27X010-105	128K x 8	105	C, I	P, J	32/32	5 V ± 5%
Am27X010-120	128K x 8	120	C, I	P, J	32/32	5 V ± 10%
Am27X010-150	128K x 8	150	C, I	P, J	32/32	5 V ± 10%
Am27X010-200	128K x 8	200	C, I	P, J	32/32	5 V ± 10%
Am27X010-255	128K x 8	250	C, I	P, J	32/32	5 V ± 5%
Am27XH010-55	128K x 8	55	C, I	P, J	32/32	5 V ± 10%
Am27XH010-70	128K x 8	70	C, I	P, J	32/32	5 V ± 10%
Am27XH010-90	128K x 8	90	C, I	P, J	32/32	5 V ± 10%

Notes: see page 2-15

ExpressROM Devices (Cont.)

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage
Am27X1024-120	64K x 16	120	C, I	P, J	40/44	5 V \pm 10%
Am27X1024-150	64K x 16	150	C, I	P, J	40/44	5 V \pm 10%
Am27X1024-200	64K x 16	200	C, I	P, J	40/44	5 V \pm 10%
Am27X1024-255	64K x 16	250	C, I	P, J	40/44	5 V \pm 5%
Am27X020-120	256K x 8	120	C, I	P, J	32/32	5 V \pm 10%
Am27X020-150	256K x 8	150	C, I	P, J	32/32	5 V \pm 10%
Am27X020-200	256K x 8	200	C, I	P, J	32/32	5 V \pm 10%
Am27X020-255	256K x 8	250	C, I	P, J	32/32	5 V \pm 5%
Am27X2048-120	128K x 16	120	C, I	P, J	40/44	5 V \pm 10%
Am27X2048-150	128K x 16	150	C, I	P, J	40/44	5 V \pm 10%
Am27X2048-200	128K x 16	200	C, I	P, J	40/44	5 V \pm 10%
Am27X2048-255	128K x 16	250	C, I	P, J	40/44	5 V \pm 5%
Am27X040-150	512K x 8	150	C, I	P, J	32/32	5 V \pm 10%
Am27X040-200	512K x 8	200	C, I	P, J	32/32	5 V \pm 10%

Notes:**1. Temperature Range**

C = Commercial (0°C to 70°C)

I = Industrial (-40°C to +85°C)

E = Extended Commercial (-55°C to +125°C)

M = Military (-55°C to +125°C) most products available in both APL and DESC versions.

2. Package Type**DIP (Dual In-Line Packages)**

D = Ceramic DIP

P = Plastic DIP

SMT (Surface Mount Technology)

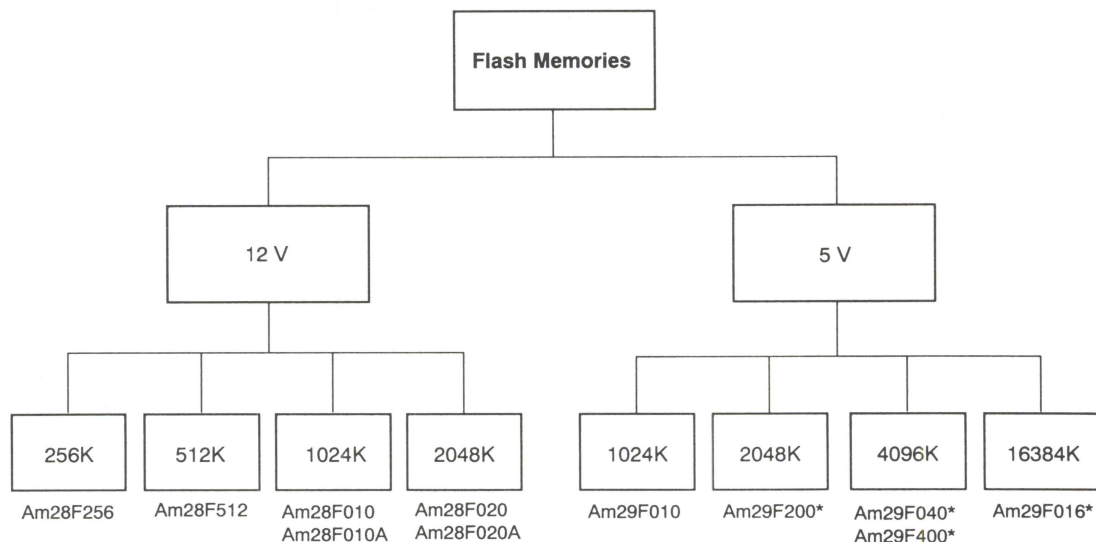
L = Rectangular Ceramic Leadless Chip Carrier

J = Rectangular Plastic Leaded Chip Carrier

E = Thin Small Outline Package – standard pin-out

F = Thin Small Outline Package – reverse pin-out

S = Small Outline Package



12 V Flash, Flashrite™/Flasherase™ Algorithms, 10K Cycle Endurance

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage	Programming Voltage
Am28F256-75	32K x 8	70	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F256-90	32K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F256-95	32K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F256-120	32K x 8	120	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F256-150	32K x 8	150	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F256-200	32K x 8	200	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F512-75	64K x 8	70	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F512-90	64K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F512-95	64K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F512-120	64K x 8	120	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F512-150	64K x 8	150	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F512-200	64K x 8	200	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010-90	128K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010-95	128K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F010-120	128K x 8	120	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010-150	128K x 8	150	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010-200	128K x 8	200	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020-90	256K x 8	90	C	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020-95	256K x 8	90	C	P, J, E, F	32/32	5 V ± 5%	12 V
Am28F020-120	256K x 8	120	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020-150	256K x 8	150	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020-200	256K x 8	200	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V

Notes: see page 2-17

12 V Flash, Embedded Algorithms, 100K Cycle Endurance

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage	Programming Voltage
Am28F010A-90	128K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010A-95	128K x 8	90	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	12 V
Am28F010A-120	128K x 8	120	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010A-150	128K x 8	150	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F010A-200	128K x 8	150	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020A-90	128K x 8	90	C	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020A-95	128K x 8	90	C	P, J, E, F	32/32	5 V ± 5%	12 V
Am28F020A-120	128K x 8	120	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020A-150	128K x 8	150	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V
Am28F020A-200	128K x 8	200	C, I, E, M	P, J, E, F	32/32	5 V ± 10%	12 V

5 V Flash, Embedded Algorithms, 100K Cycle Endurance

Part Number	Organization	Access Time (ns)	Temp Range ¹	Package Type ²	Pin Count (DIP/SMT)	Supply Voltage	Programming Voltage
Am29F010-45	128K x 8	45	C, I	D, L, P, J, E, F	32/32	5 V ± 5%	5 V
Am29F010-55	128K x 8	55	C, I	D, L, P, J, E, F	32/32	5 V ± 10%	5 V
Am29F010-70	128K x 8	70	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	5 V
Am29F010-90	128K x 8	90	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	5 V
Am29F010-120	128K x 8	120	C, I, E, M	D, L, P, J, E, F	32/32	5 V ± 10%	5 V
Am29F040-70*	512K x 8	70	C	L, J, E, F	32/32	5 V ± 10%	5 V
Am29F040-90*	512K x 8	90	C, I, E, M	L, J, E, F	32/32	5 V ± 10%	5 V
Am29F040-120*	512K x 8	120	C, I, E, M	L, J, E, F	32/32	5 V ± 10%	5 V
Am29F200-70*	128K x 16	70	C	E, F, S	48/44	5 V ± 10%	5 V
Am29F200-90*	128K x 16	90	C, I, E	E, F, S	48/44	5 V ± 10%	5 V
Am29F200-120*	128K x 16	120	C, I, E	E, F, S	48/44	5 V ± 10%	5 V
Am29F400-70*	256K x 16	70	C	E, F, S	48/44	5 V ± 10%	5 V
Am29F400-90*	256K x 16	90	C, I, E	E, F, S	48/44	5 V ± 10%	5 V
Am29F400-120*	256K x 16	120	C, I, E	E, F, S	48/44	5 V ± 10%	5 V
Am29F016-70*	2M x 8	70	C	E, F	48	5 V ± 10%	5 V
Am29F016-90*	2M x 8	90	C, I, E	E, F	48	5 V ± 10%	5 V
Am29F016-120*	2M x 8	120	C, I, E	E, F	48	5 V ± 10%	5 V

Notes:**1. Temperature Range**

C = Commercial (0°C to 70°C)

I = Industrial (-40°C to +85°C)

E = Extended Commercial (-55°C to +125°C)

M = Military (-55°C to +125°C) most products available in both APL and DESC versions.

2. Package Type**DIP (Dual In-Line Packages)**

D = Ceramic DIP with Quartz Window

P = Plastic DIP

SMT (Surface Mount Technology)

L = Rectangular Ceramic Leadless Chip Carrier with Quartz Window

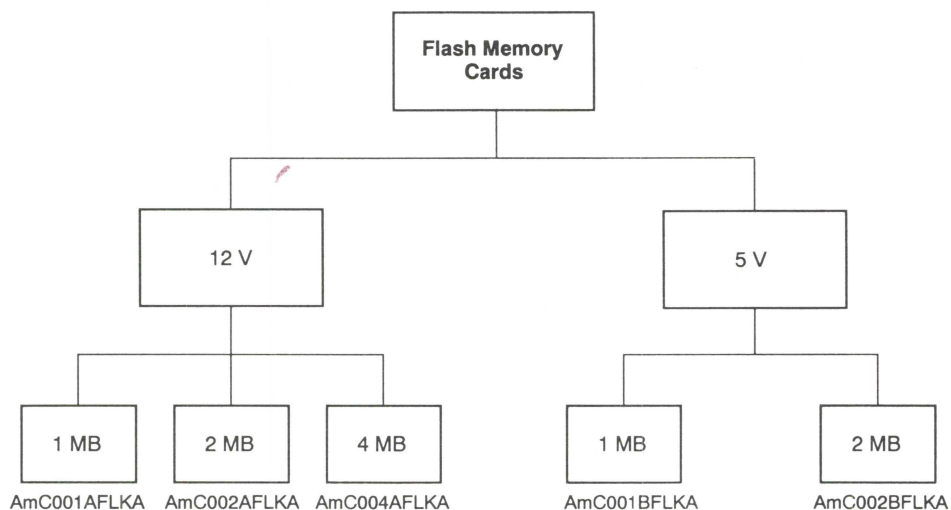
J = Rectangular Plastic Leadless Chip Carrier

E = Thin Small Outline Package – standard pin-out

F = Thin Small Outline Package – reverse pin-out

S = Small Outline Package

*Contact the local AMD sales office for availability of this device.



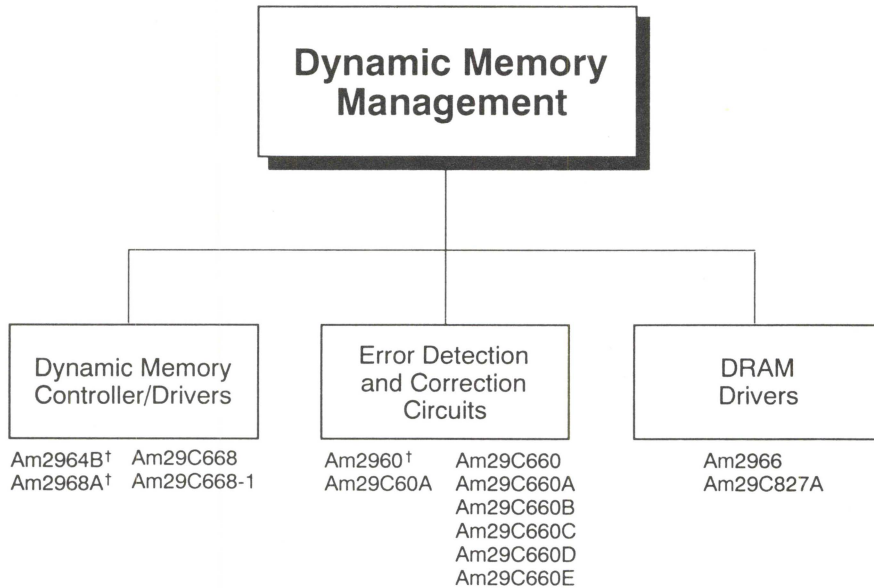
12 V Flash Memory Cards

Part Number	Density (Mbytes)	Access Time (ns)	Temp Range ¹	Package Type (PCMCIA)	Minimum Write Cycles	Automated Write/Erase Operations	Read Voltage	Write Voltage
AmC001AFLKA	1	250 ns	C	68-Pin, Type 1	100,000	Yes	5 V ± 5%	12 V ± 5%
AmC002AFLKA	2	250 ns	C	68-Pin, Type 1	100,000	Yes	5 V ± 5%	12 V ± 5%
AmC004AFLKA	4	250 ns	C	68-Pin, Type 1	100,000	Yes	5 V ± 5%	12 V ± 5%

5 V Flash Memory Cards

Part Number	Density (Mbytes)	Access Time (ns)	Temp Range ¹	Package Type (PCMCIA)	Minimum Write Cycles	Automated Write/Erase Operations	Read Voltage	Write Voltage
AmC001BFLKA	1	200 ns	C	68-Pin, Type 1	100,000	Yes	5 V ± 5%	5 V ± 5%
AmC002BFLKA	2	200 ns	C	68-Pin, Type 1	100,000	Yes	5 V ± 5%	5 V ± 5%

Dynamic Memory Management



Introduction

Dynamic Memory Management

AMD's total system solution to managing high-performance dynamic memories offers flexibility, integration, and performance. Functional blocks include the industry's fastest 32- and 16-bit Error Detection and Correction circuits, the Am29C660 and Am29C60. These industry-standard devices offer as much as a 46% speed improvement over comparable solutions.

The Am29C668 is the key to flexible DRAM control. It offers configurable control of 4M through 64K Dynamic RAM and offers a wide range of high-performance access modes including Burst, "Cache" (page), Bank Interleave, and Nibble commonly used by today's newest RISC and CISC microprocessors. Other new features include byte-write support, auto-timing, and EDC initialization. Like the EDCs, the Am29C668 is the fastest CMOS Controller/Driver in the industry.

DRAM address drive capability is available through the Am2966 Octal Driver and the Am29C827A 10-bit buffer.

Features

- Industry's fastest EDC
- Flexible DRAM control
- Drive for 4 Mbit DRAMS

Benefits

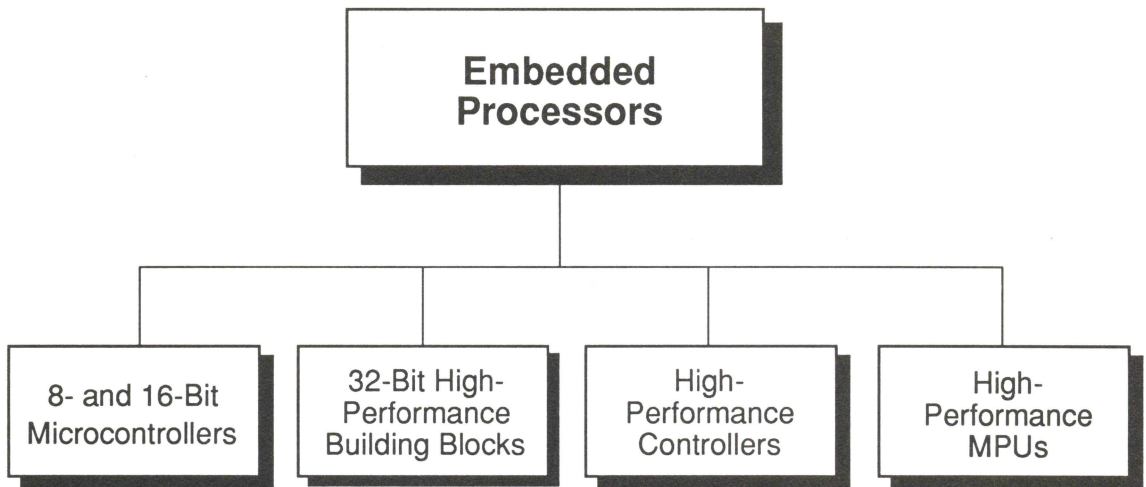
- Data integrity without performance penalty
- Complete system solutions
- Reduced memory cycle times

Part Number	Description	Part Number	Description
Dynamic Memory Management			
Dynamic Memory Controller/Drivers			
Am2964B [†]	64K Dynamic Memory Controller (Not recommended for new designs)	Am29C660A	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (36 ns)
Am2968A [†]	256K Dynamic Memory Controller/Driver	Am29C660B	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (30 ns)
Am29C668	4M Configurable Dynamic Memory Controller/Driver	Am29C660C	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (24 ns)
Am29C668-1	4M Configurable Dynamic Memory Controller/Driver, High Speed	Am29C660D	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (18 ns)
Error Detection and Correction Circuits		Am29C660E	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (14 ns)
Am2960 [†]	Cascadable 16-Bit Error Detection and Correction Circuit (65 ns)	DRAM Drivers	
Am29C60A	CMOS Cascadable 16-Bit Error Detection and Correction Circuit (30 ns)	Am2966	8-Bit Dynamic Memory Driver, Three- State, Non-Inverting
Am29C660	CMOS Cascadable 32-Bit Error Detection and Correction Circuit (49 ns)	Am29C827A	CMOS 10-Bit Buffer

[†]Not recommended for new designs.

MICROPROCESSORS AND RELATED PERIPHERALS

Embedded Processors

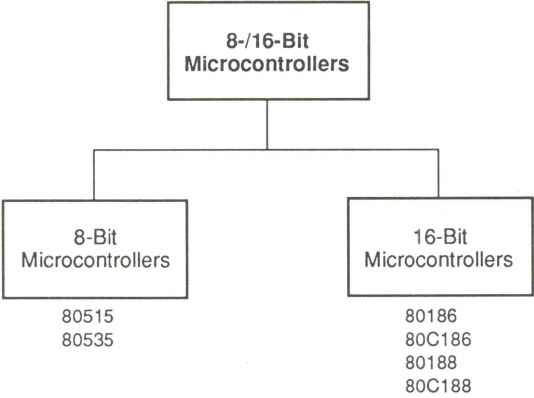


Introduction

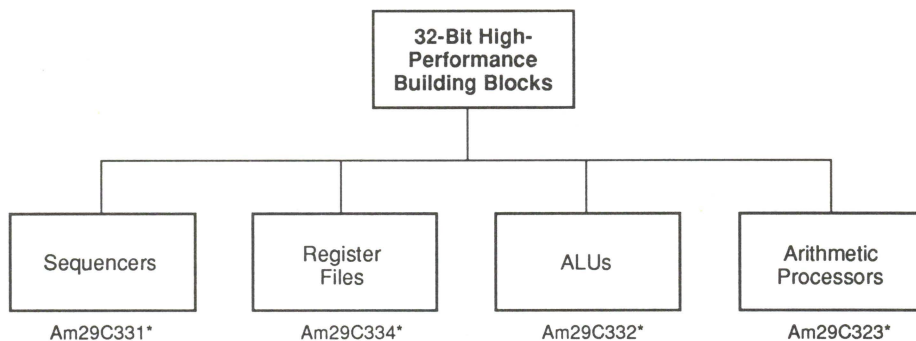
The embedded processor division supplies 8- and 16-bit microcontrollers as well as bit slice and building block microprocessors and field programmable controllers. These products span a broad range of embedded control applications, from simple electromechanical interface control to high-speed data

and event control, to very-high-speed signal processing applications such as radar and graphics.

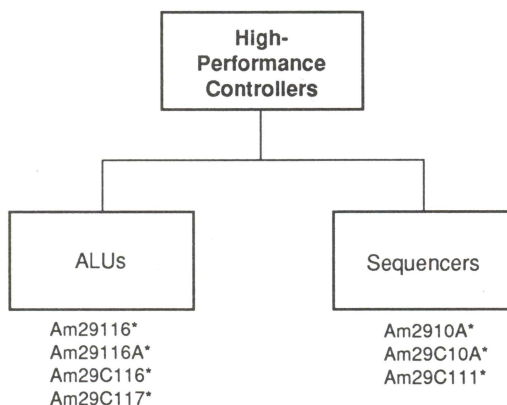
The emphasis is on high performance, enhanced features, and a good cost/performance value equation.



Part Number	Description	Part Number	Description
8-Bit Microcontrollers		16-Bit Microcontrollers	
80515	8-Bit Microcontroller with 8K Custom ROM Plus A/D and Pulse Width Modulation	80186	Highly Integrated 16-Bit Microprocessor
80535	8-Bit Microcontroller without ROM Plus A/D & Pulse Width Modulation	80C186	CMOS 16-Bit Microcontroller, CPU plus Peripherals
		80188	Highly Integrated 8-Bit Microprocessor
		80C188	CMOS 16-Bit Microcontroller, CPU Plus Peripherals with 8-Bit I/O

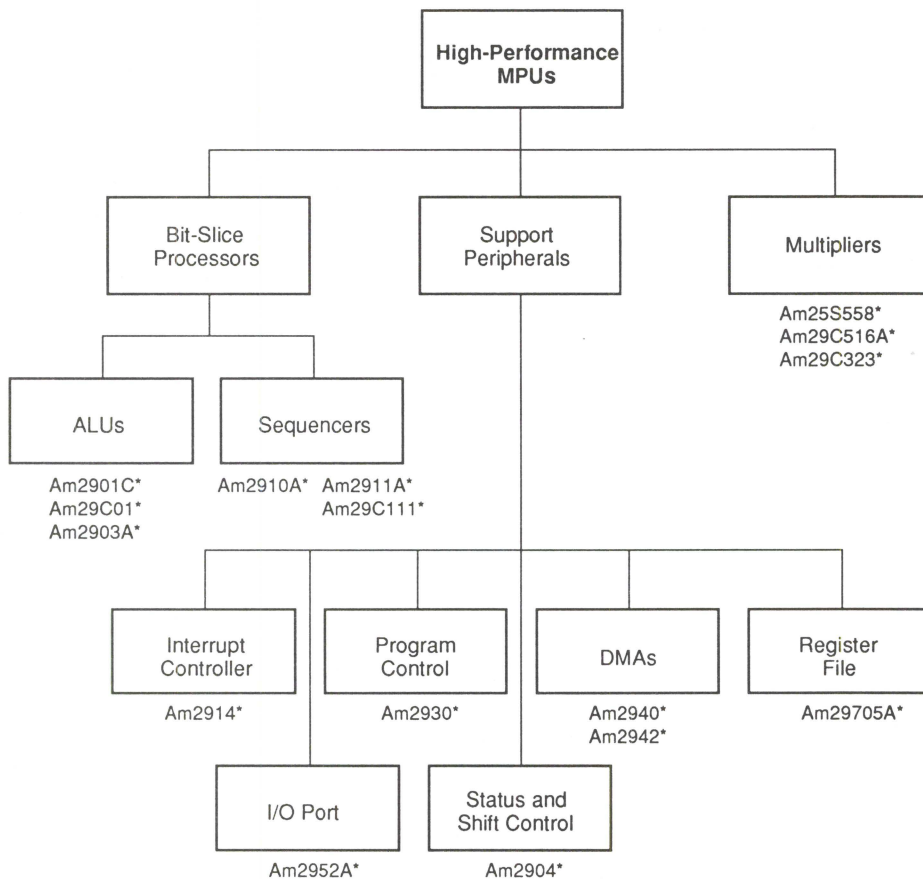


Part Number	Description	Part Number	Description
32-Bit High-Performance Building Blocks			
Am29C323*	32 x 32-Bit Multiplier, CMOS	Am29C332*	32-Bit Arithmetic Logic Unit, CMOS
Am29C331*	16-Bit Sequencer, CMOS	Am29C334*	64 x 18 Four-Port RAM, CMOS



Part Number	Description	Part Number	Description
High-Performance Controllers			
Am2910A*	12-Bit Sequencer (Microprogram Controller)	Am29116A*	16-Bit Microcycle Microprocessor/Microcontroller, 75 ns, 52 Pins
Am29C10A*	12-Bit Sequencer, CMOS	Am29C116*	CMOS Am29116, 80 ns
Am29C111*	16-Bit Sequencer, CMOS	Am29C117*	CMOS Dual-Port ALU similar to 29C116
Am29116*	16-Bit Microcycle Microprocessor/Microcontroller, 100 ns, 52 Pins		

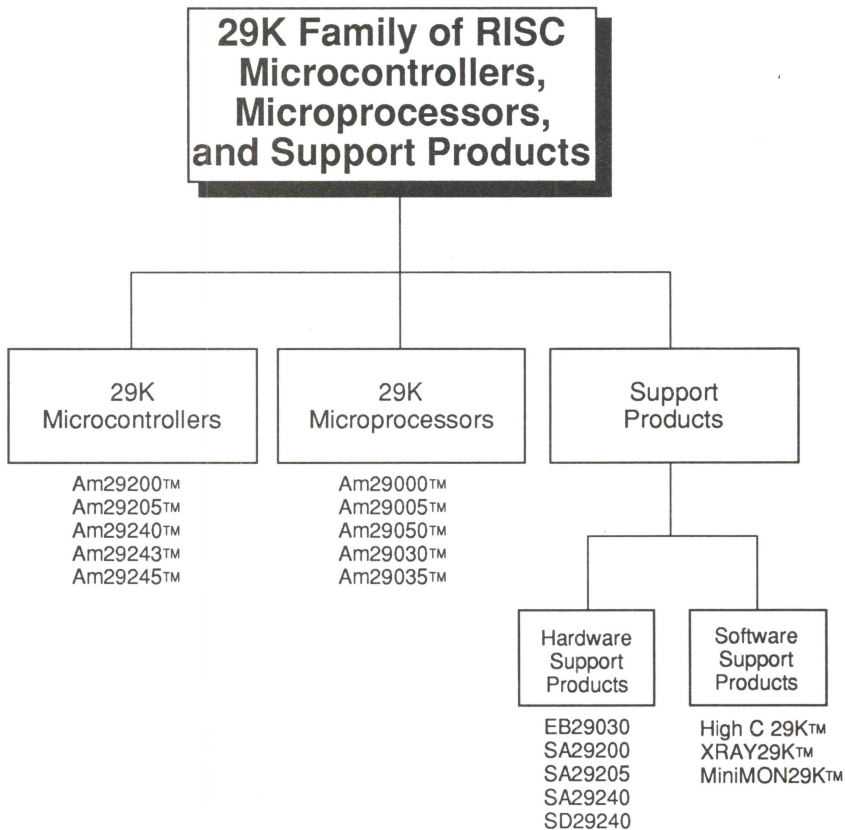
*Part will be obsoleted in December 1993, last shipment in December 1994.



Part Number	Description	Part Number	Description
High-Performance MPUs			
Am25S558*	8-Bit Multiplier without Transparent Latch, 55 ns, 40 Pins	Am2914*	Vectored Priority Interrupt Controller, 40 Pins
Am2901C*	4-Bit Microprocessor Slice, 40 Pins	Am2930*	Program Control Unit, 28 Pins
Am29C01*	4-Bit Microprocessor Slice, CMOS, 40 Pins	Am29C323*	CMOS 32 x 32-Bit Multiplier, 50ns
Am2903A*	4-Bit Slice with Multiply and Divide, 48 Pins	Am2940*	DMA Address Generator, 28 Pins
Am2904*	Status and Shift Control Unit, 40 Pins	Am2942*	Programmable Timer/Counter/DMA Address Generator, 22 Pins
Am2910A*	Microprogram Controller, 40 Pins	Am29C516A*	16-Bit Multiplier, Low Power, 35 ns, 64 Pins, CMOS
Am2911A*	Microprogram Sequencer, 20 Pins	Am2952A*	8-Bit Bidirectional I/O Port, 24 Pins
Am29C111*	16-Bit Sequencer, CMOS	Am29705A*	16-Word by 4-Bit, Dual-Port RAM, 28 Pins

*Part will be obsoleted in December 1993, last shipment in December 1994.

Embedded Processors—29K Family



Introduction

Companies such as Apple, Compaq, Evans & Sutherland, Lexmark, Samsung, Sharp, Tektronix, and other leading manufacturers have selected the AMD 29K™ Family of microprocessors and microcontrollers for their products. These processors offer system designers the widest range of RISC-based performance available, supporting low system cost with flexible, economical memories and providing growth paths for future designs. AMD 29K processors are optimized for embedded and distributed intelligence systems, including graphics systems, networking applications, peripherals, laser printers, and high-speed peripheral and communication devices.

Advanced RISC designs are simplified with 29K products. Our proprietary, 32-bit RISC architecture, integrated caches, proven CMOS process technology, and complete turnkey application solutions combine to provide excellent cost-performance benefits for embedded applications.

- 32-bit microprocessor/microcontroller family for embedded applications
- RISC-based architecture for exceptionally fast performance

- Full system solution with impressive cost-performance
- Advanced CMOS process technology
- High level of integration for easy system design
- Optimizing compilers and extensive operating system support
- Comprehensive software and hardware development tools
- Turnkey application solutions for faster time-to-market

The entire 29K product family is supported by the most comprehensive embedded RISC support program in the industry: the Fusion29KSM Program. The Fusion29K Program helps minimize design time and helps speed your product to market. More than 120 third-party partners offer over 230 application-specific hardware and software development solutions.

AMD also offers a complete set of development tools to evaluate the 29K Family and to develop and debug your 29K software: the High C 29K development toolkit for C, the XRAY29K source-level debugger, MiniMON29K monitor software and 29K Family execution boards.

29K Family Overview

Am29000 RISC Microprocessor Powers Integer Intensive Applications

The AMD Am29000 RISC processor is a high-performance, general purpose, 32-bit microprocessor implemented in CMOS technology. The processor offers all the powerful features necessary for your high-performance systems, without restricting system flexibility. The processor goes beyond first generation RISC technology by extracting performance from low-cost memory architecture, reducing your overall system cost. The Am29000 processor's value advantage is a result of several processor attributes, including a large on-chip register file organized as a stack data cache to eliminate data access delays, a three bus architecture for maximum bandwidth, burst mode instructions for higher transfer rates, an on-chip Branch Target Cache™ memory to hide instruction memory latency, and an on-chip memory management unit for flexible memory designs.

The Am29000 processor is well-suited for a variety of embedded and distributed intelligence application markets, where high-performance, low-cost, and the ability to program using ANSI C and Ada software tools is important. These include:

- Laser printers
- Networking: FDDI, bridges, and routers
- Graphics, including scientific visualization, multimedia, and X terminals
- Telecommunications, including PABX systems, switches, and cellular control systems
- Avionics and military
- Embedded systems requiring high integer performance

Am29005 Low-Cost RISC Processor Reduces Your System Cost

Many low-end to mid-range applications, such as inexpensive laser beam printers and scanners, are very price sensitive, and processor and system costs are critical to gaining market share. For these applications, AMD offers the Am29005 low-cost RISC processor operating at 16 MHz and providing a sustained performance of six to nine MIPS. The Am29005 processor uses the Am29000 processor core, minus the Branch Target Cache memory and memory management unit. The Am29005 processor is hardware and software compatible with the Am29000 processor, providing an easy upgrade path for many cost-sensitive embedded applications including:

- Laser printers
- Optical Character Recognition systems
- Networking

Am29050 Processor Offers a Range of High Floating Point Performance

The AMD Am29050 floating point processor extends the 29K Family of RISC offerings with a high-performance, pipelined, on-chip floating point unit. The Am29050 processor provides graphics and imaging applications with fast 3D performance and printers with high Page Description Language (PDL) performance. The key to this performance is the on-chip floating point unit, which can simultaneously execute the multiplication and addition operations common to many graphics systems.

The Am29050 processor's enhanced architectural design allows it to improve integer and floating point performance with low-cost memory systems. The Am29050 processor is fully hardware and software compatible with the Am29000

processor, and can be used in existing Am29000 processor applications with no design modifications. This complete compatibility ensures mature development tools from AMD and Fusion29K partners, and speeds your Am29050 processor-based application to market.

The Am29050 processor is well-suited for a variety of embedded and distributed intelligence application markets, including:

- Graphics and 3D imaging
- High-performance printers
- Signal processing
- Digital communications
- X terminals
- Any application requiring high-performance floating point

Am29030 and Am29035 Processors with 8K/4 Kbyte Instruction Caches

The Am29030 and Am29035 processors offer improved performance and complete software compatibility, as well as an easy memory interface. Together they provide a foundation for taking the 29K Family to higher performance.

The Am29030 processor features a 29K Family-compatible core, an on-chip 8 Kbyte instruction cache and Scalable Clocking™ technology, which optionally allows the memory system to operate at half the processor's frequency. The device's high-performance, two-bus architecture supports simple, burst, page-mode and interleaved memories. Support is available for x8, x16, and x32 ROMs. Full on-chip IEEE 1149.1 JTAG debug support ensures adherence to emerging board testing standards and enhances design development. The Am29030 processor is offered at 20, 25, and 33 MHz.

The 16 MHz Am29035 processor is a lower cost, hardware-compatible version of the Am29030 processor, including identical bus and system timings at a slower clock speed and a 4 Kbyte, direct-mapped instruction cache. The processor's programmable bus sizing capability enables the system to accommodate x16 or x32-bit memory systems. This capability allows memory to be added in half-megabyte increments rather than a full megabyte of memory to support 32-bit systems.

29K Family Microcontrollers

The 29K microcontroller product offering, including the Am29200, Am29205, Am29240, Am29245, and the Am29243 microcontrollers, allows users to benefit from the very high performance of the 29K architecture, while also capitalizing on the very low system cost made possible by the integration of processor and peripherals.

29K Family microcontrollers are 100% binary software compatible with the entire 29K Family—29K Family microcontrollers can be used in existing 29K Family microprocessor applications without software modifications. System cost is minimized by each 29K microcontroller by incorporating a complete set of system facilities commonly found in embedded applications, eliminating the cost of additional components.

Many general embedded designs can be developed with little or no additional hardware design, plus short development time means fast time to market.

Each 29K Family microcontroller represents a unique milestone in microcontroller design and functionality. 29K Family microcontrollers offer:

- Performance at low cost
- Design flexibility
- Reduced time-to-market
- A rational, easy upgrade path

The Am29200 microcontroller was the first 32-bit microcontroller on the market to combine complete CPU, memory control, and I/O subsystems in a single device. The Am29200 microcontroller includes a complete set of common system peripherals, making it the easiest 32-bit solution available to system designers.

For designs requiring high performance, the Am29200 microcontroller offers a highly integrated, compact design—at higher performance than CISC processors. The highly integrated Am29200 delivers key benefits. Lower component parts make systems more reliable. Fewer parts have to be powered, thus lowering the power consumption and heat dissipation needed by the system. System hardware design is easier because fewer parts need to be considered and less board space can be used. Also, testing is faster and simpler with fewer parts to check.

The success of the Am29200 has been complemented by the introduction of the Am29205, a low-cost version of the Am29200. The Am29205 comes complete with the same on-chip functions as the Am29200 microcontroller, yet features an external 16-bit bus interface, while internally maintaining the 32-bit 29K CPU architecture for high performance. The cost structure of the Am29205 microcontroller allows new applications to take advantage of RISC performance at a lower system cost superior to that of CISC microprocessors. The result is a high performance system with a small solution cost. As a result, the Am29205 microcontroller is a perfect upgrade solution for 16-bit CISC designs that are running out of gas.

The 29K design team is committed to making RISC performance affordable to customers and then providing a performance upgrade path for designers. The Am29240, Am29243, and Am29245 microcontrollers were announced this May—extending the performance migration path of the Am29200 and Am29205 microcontrollers. These new 29K Family microcontrollers are enhanced, bus-compatible extensions of the Am29200 microcontroller family offering:

- Higher level of integration
- Low system cost
- Low-cost 196 pin PQFP
- More efficient use of low-cost memories
- 2–4 times the performance of the Am29200/205
- Software compatibility with the rest of the 29K Family

Each Am29240 series microcontroller was created to perform a variety of functions, each aimed at supporting unique embedded design requirements. The on-chip caches, memory management unit, faster integer math, and extended DMA addressing of the Am29240 series of microcontrollers provides embedded systems designers with increased levels of performance and software compatibility throughout a range of products.

Based on static low-voltage design, these CMOS-technology devices offer a complete set of system peripherals and interfaces commonly used in embedded applications. Compared to CISC processors, the Am29240 series microcontrollers offer better performance, more efficient use of low-cost memories, lower system cost, and complete design flexibility for the embedded designer.

For general purpose embedded applications, such as mass storage controllers, communications, digital signal processing, networking, industrial control, pen-based systems, and multimedia, the Am29240 microcontroller provides a high-performance solution with a low total system cost. The memory interface of the Am29240 microcontroller provides even faster direct memory access than the Am29200 microcontroller. This performance improvement minimizes the effect of memory latency, allowing designers to use low-cost memory with simpler memory designs. On-chip instruction and data caches, as well as a single-cycle integer multiplier provide even better performance for time-critical code. Other on-chip functions include: a ROM controller, DRAM controller, peripheral interface adapter controller, DMA controller, programmable I/O port, parallel port controller, serial ports, and an interrupt controller.

The low-cost Am29245 microcontroller is similar to the Am29240 microcontroller without the data cache and 32-bit multiplier. The Am29245 microcontroller is designed for embedded applications in which cost and space constraints, along with increased performance requirements, are primary considerations. In addition, the Am29245 microcontroller provides an easy upgrade path for the Am29200 and Am29205 microcontroller-based products.

The Am29243 data microcontroller is the industry's first RISC data controller! With DRAM parity support and a full MMU, the Am29243 data microcontroller is recommended for communications applications that require high-speed data movement and fast protocol processing in a fault-tolerant environment.

The Am29243 data microcontroller is similar to the Am29240 microcontroller, without the video interface. Both the Am29243 and Am29240 microcontrollers support fly-by DMA at 100 Mbytes/s for LANs and switching applications, and a two-cycle Multiply Accumulate function for DSP applications. The low-power requirements make either microcontroller a great choice for field-deployed devices.

For More Information

To order additional 29K Family Literature, call the 29K Family Hotline at 800-292-9263, ext. 3, or contact your local AMD sales office.

29K Family Processors:	Am29000	Am29005	Am29050	Am29030	Am29035
Buses (32-bit)	3 Address, Instruction Data	3 Address, Instruction Data	3 Address, Instruction Data	2 Address, Combined I/D	2 Address, Combined I/D
Instruction Cache	BTC 32 x 4 words	No	BTC 128 x 2 or 64 x 4 words	8 Kbytes	4 Kbytes
Cache Associativity	2 Way	N/A	2 Way	2 Way	Direct Mapped
On-Chip Floating Point Unit	No	No	Yes	No	No
On-Chip Memory Management	Yes	No	Yes	Yes	Yes
On-Chip Large Region Mangement	No	No	Yes	No	No
Max Data Burst Length (Bytes)	1K	1K	1K	1K	1K
Max Instruction Burst Length (Bytes)	1K	1K	1K	1K	1K
Upward Binary Software Compatibility	Yes	Yes	Yes	Yes	Yes
Hardware Compatibility with:	Am29005/ Am29050	Am29000	Am29000	Am29035 ¹	Am29030 ¹
On-Chip Interrupt Controller Interrupts	Yes 6	Yes 6	Yes 6	Yes 6	Yes 6
Endian	Both	Both	Both	Both	Both
JTAG Debug Support	No	No	No	Yes	Yes
Half Speed External Bus Option	No	No	No	Yes	Yes
Programmable Bus Sizing™ Feature	No 32-bit only	No 32-bit only	No 32-bit only	Yes	Yes 8/16/32 bits
Clock Speeds (MHz)	16, 20, 25, 33	16	20, 25, 33, 40	25, 33	16
Packages Ceramic Pin Grid Array Plastic Quad Flat Pack	169 Lead 168 Lead (16 MHz)	N/A 168 Lead	169 Lead N/A	145 Lead N/A	N/A 144 Lead

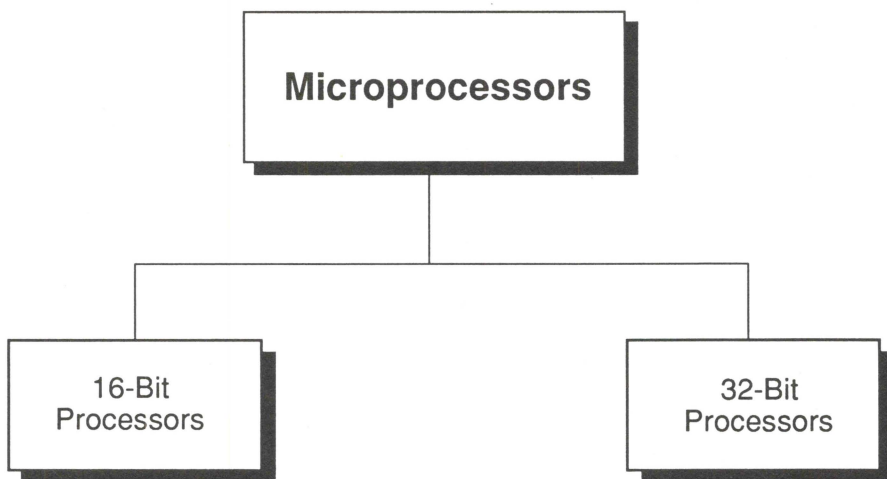
Note:

1. Am29030 and Am29035 processors will also be compatible with future, higher performance members of the 29K Family.

Feature:	Am29205	Am29200	Am29245	Am29240	Am29243
Instruction Cache	—	—	4 Kbytes	4 Kbytes	4 Kbytes
Data Cache	—	—	—	2 Kbytes	2 Kbytes
Integer Multiplier	Software	Software	Software	32 x 32-bit	32 x 32-bit
MMU	—	—	1 TLB 16 Entry	1 TLB 16 Entry	2 TLBs 32 Entry
Data Bus Width					
Internal	32 bits	32 bits	32 bits	32 bits	32 bits
External	16 bits	32 bits	32 bits	32 bits	32 bits
ROM Interface					
Banks	3	4	4	4	4
Width	16-bits only	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits
ROM Size (Max/Bank)	4 Mbytes	16 Mbytes	16 Mbytes	16 Mbytes	16 Mbytes
Boot-Up ROM Width	16 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits
Burst-Mode Access	Not Supported	Supported	Supported	Supported	Supported
DRAM Interface					
Banks	4	4	4	4	4
Width	16 bits only	16, 32 bits	16, 32 bits	16, 32 bits	8, 16, 32 bits
Size: 32-Bit Mode	—	16 Mbytes/bank	16 Mbytes/bank	16 Mbytes/bank	16 Mbytes/bank
Size: 16-Bit Mode	8 Mbytes/bank	8 Mbytes/bank	8 Mbytes/bank	8 Mbytes/bank	8 Mbytes/bank
Video DRAM	Not Supported	Supported	Supported	Supported	Not Supported
Initial Burst Access Cycles	3/2	3/2	2/1	2/1	2/1
On-Chip DMA					
Width (ext. peripherals)	8, 16 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits
Externally Controlled	1 Channel	2 Channels	2 Channels	4 Channels	4 Channels
GREQ/GACK Access	No	Yes	Yes	Yes	Yes
GREQ/GACK Burst	No	No	Yes	Yes	Yes
TDMA	No	Yes	Yes	Yes	Yes
Double-Frequency CPU Option	No	No	No	Yes	Yes
Low Voltage Operation	No	No	Yes	Yes	Yes
PIA					
PIA Ports	2	6	6	6	6
Data Width	8, 16 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits	8, 16, 32 bits
Cycle	3	3	2	2	2
Programmable I/O Port Signals	8	16	16	16	16
Serial Ports					
Ports	1 Port	1 Port	1 Port	2 Ports	2 Ports
DSR	Not Supported	Supported	Supported	1 Port Supported	1 Port Supported
DTR	Not Supported	Supported	Supported	1 Port Supported	1 Port Supported
Interrupt Controller					
External Interrupt Pins	2	4	4	4	4
External Trap and Warn Pins	0	3	3	3	3
Parallel Port Controller	Yes	Yes	Yes	Yes	Yes
Full-Word Transfer	No	Yes	Yes	Yes	Yes
JTAG Testing	No	Yes	Yes	Yes	Yes
Serializer/Deserializer	Yes	Yes	Yes	Yes	No
DRAM Parity	No	No	No	No	Yes
Pin Count/Package	100 PQFP	168 PQFP	196 PQFP	196 PQFP	196 PQFP
Processor Clock Rate	16 MHz	16, 20 MHz	16 MHz	20, 25, 33 MHz	20, 25, 33 MHz

Part Number	Description	Part Number	Description
29K Family Advanced System Components		SA-29200	Evaluation Board for Am29200 Application Based Software
Am29000	High-Performance, 32-Bit RISC CPU	SA-29205	Evaluation Board for Am29205 Application Based Software
Am29050	High-Performance, 32-Bit RISC CPU with Pipelined, On-Chip Floating Point Unit	SA-29240	Development and Evaluation Board for Am29240 Application Based Software
Am29005	High-Performance, 32-Bit RISC CPU without MMU and Branch Target Cache for Cost-Sensitive Embedded Applications	SD-29240	Low-Cost Version of SA-29240 Evaluation Board, Suited for Demonstration of the Am29240 or Am29245 Microcontroller
Am29035	Low-Cost, Two-Bus Member of 29K Family	29K Third-Party Support Products	
Am29030	High-Performance, Two-Bus Member of the 29K Family	Fusion29K	Over 230 29K Hardware and Software Development and Turnkey Solutions are Described in the Fourth Edition of the Fusion29K Catalog (#11426E)
Am29200	32-Bit 29K Microcontroller	29K Software Support Products	
Am29205	Low-Cost 29K Microcontroller with 16-Bit Bus Interface	High C 29K	C Compiler (ANSI standard) and Assembler (ASM29K) ported on the PC-386 and Sun-4.
Am29240	High-Performance, Highly Integrated 32-Bit 29K Microcontroller	XRAY29K	Source Level Debugger, Multi-Window Interactive Environment for Debugging C or Assembly Code, Ported on the PC-386 and Sun-4
Am29243	High-Performance "Data Controller" 32-Bit 29K Microcontroller	MiniMON29K	Resident Debug Monitor that Provides Low-Level Control and Debug (Source Included)
Am29245	Low-Cost, Highly Integrated 32-Bit 29K Microcontroller		
29K Hardware Support Products			
EB29030	PC Evaluation Board for Am29030 Application Based Software Development on an IBM PC-AT		

Microprocessors



Introduction

Advanced Micro Devices offers a wide range of microprocessors, from the 80286 to the new Am486. We offer the WORLD'S FASTEST 386s which includes the 386DX/DXL-40 and the SX-40. AMD maintains compatibility with the 80486 and 80386 microprocessors currently available, and offers both the Am486 and Am386 processors in various packages and technologies.

Am486™ Microprocessors

The Am486DX CPU offers the highest performance for DOS, OS/2, Windows, and UNIX applications. It is 100% binary compatible with the 386 architecture. One million plus transistors integrate cache memory, floating-point hardware, and memory management on-chip while retaining binary compatibility with previous members of the x86 architectural family. The Am486DX microprocessor is a high speed, true static implementation of the i486DX. It is ideal for both desktop and battery-powered notebook personal computers.

Am386® Microprocessors

The Am386DX/DXL processors and the Am386SX/SXL processors are high-performance 32-bit processors compatible with hardware designed for 386-based systems and with

operating systems and commercially available software applications written for the 386DX microprocessor. The 40 MHz Am386DX/DXL processor offers system designers a 21% increase in performance over a 33 MHz 386DX while the 40 MHz Am386SX/SXL processor offers a 21% increase in performance over a 33 MHz 386SX and a 50% increase in performance over a 25 MHz 386SX.

AMD is the industry leader in offering a 386 microprocessor that runs at 3.3 V. This allows system designers to significantly improve battery life in portable systems. AMD is working closely with several other silicon manufacturers to ensure that key components required to design a complete motherboard operating at this 3.3 V standard are available. The Am386SXLV/DXLV microprocessors also support System Management Mode by including SMI, a feature which allows power management to be implemented transparent to system applications, operating systems and mode of operation.

In addition to standard PGA packaging, the Am386SX/SXL/SXLV/DX/DXL/DXLV and the Am486DXLV/SXLV microprocessors are also available in plastic quad flat pack (PQFP) surface mount packages.

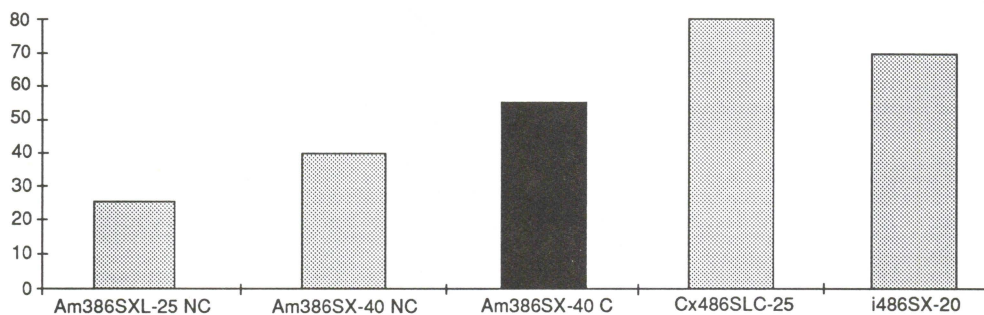


Figure 1. Landmark 2.0

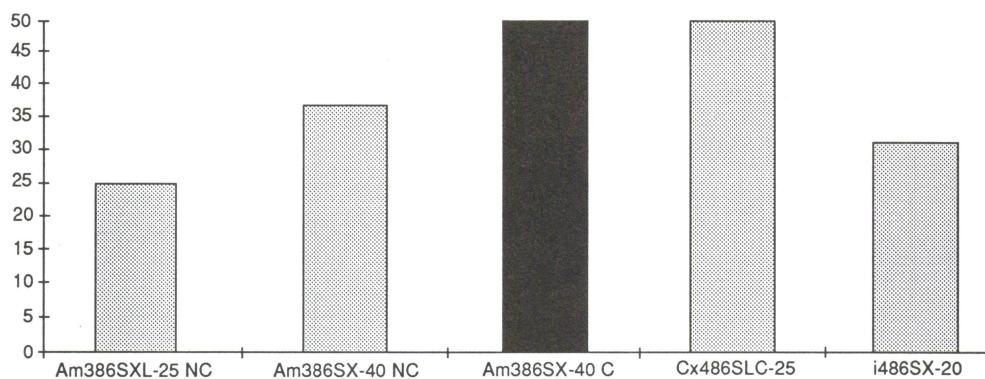


Figure 2. Norton SI

In the above benchmarks, the Am386SXL-25 system was run without cache (NC); the Am386SX-40 was run both with 32K cache (C) and also no cache (NC); Cx486SLC systems were run with 1K internal cache; i486SX-20 was run with 8K internal cache.

Note: Higher Numbers = Higher Performance.

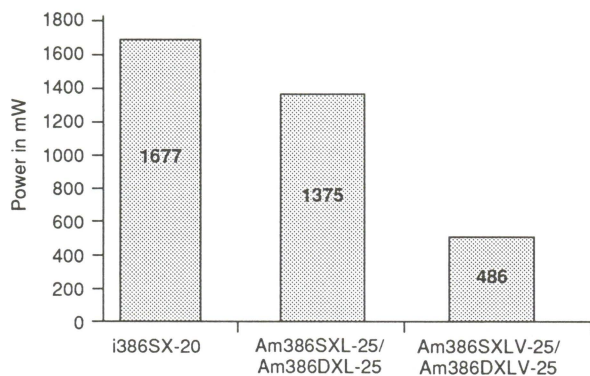


Figure 3. Minimum Power Comparisons

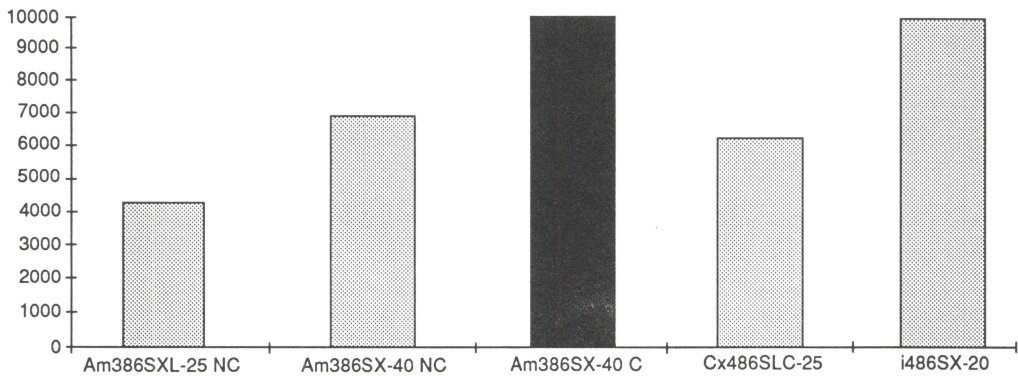


Figure 4. Dhrystone 1.1

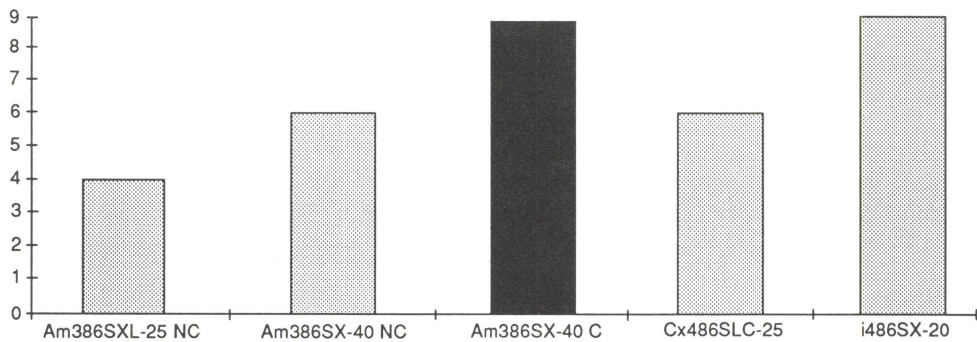
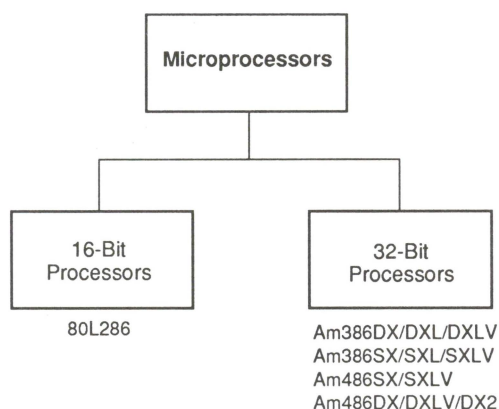


Figure 5. Power Meter 1.5 (MIPS)

In the above benchmarks, the Am386SXL-25 system was run without cache (NC); the Am386SX-40 was run both with 32K cache (C) and also no cache (NC); Cx486SLC systems were run with 1K internal cache; i486SX-20 was run with 8K internal cache.

Note: Higher Numbers = Higher Performance.

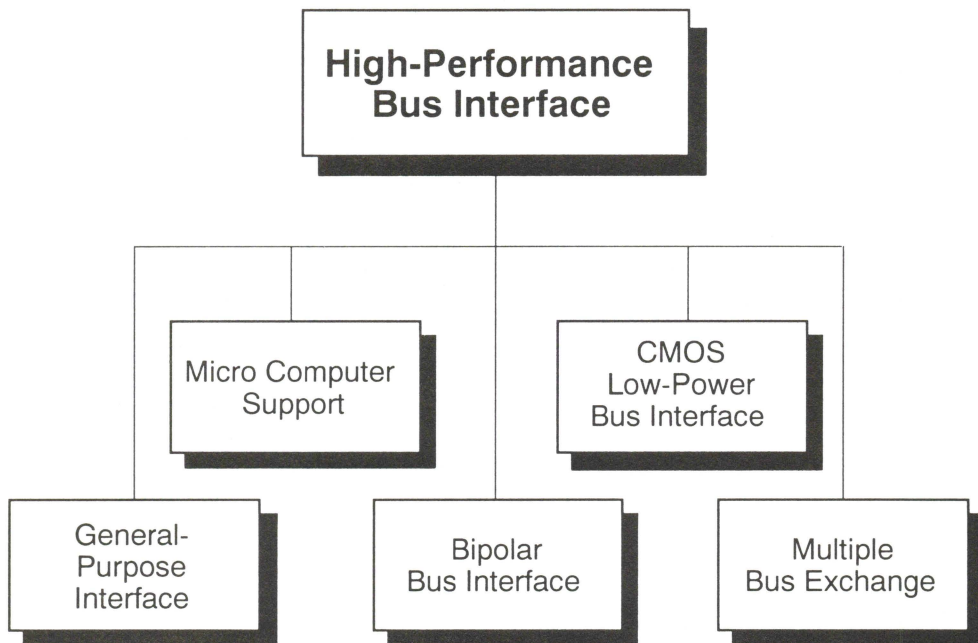


Part Number	Description	Part Number	Description
Microprocessors			
Am486DX	High-Performance, 32-Bit Microprocessor	Am386DXL	Low-Power, High-Performance 32-Bit Microprocessor
Am486DXLV	High-Performance, Low-Voltage, 32-Bit Microprocessor	Am386DXLV	High-Performance, Low-Voltage, 32-Bit Microprocessor
Am486DX2	High-Performance, 32-Bit Clock Doubled Microprocessor	Am386SX	High-Performance 32-Bit Microprocessor with 16-Bit Data Bus
Am486SX	High-Performance 32-Bit Microprocessor with 16-Bit Data Bus	Am386SXL	Low-Power, High-Performance, 32-Bit Microprocessor with 16-Bit Data Bus
Am486SXLV	High-Performance, Low-Voltage, 32-Bit Microprocessor with 16-Bit Data Bus	Am386SXLV	High-Performance, Low-Voltage, 32-Bit Microprocessor with 16-Bit Data Bus
Am386DX	High-Performance, 32-Bit Microprocessor	80L286	Low Power, High-Performance, 16-Bit Processor

System Integration Guide

Personal Computer Segment	Processor Products
Desktop	80286-12/16 80386DX-20/25/33/40 80386SX-25/33/40 80486DX-33/40 80486DX2 80486SX-33/40
Portable (Laptop, Notebook, Palmtop)	80386SXL-25/33/40 80386DXL-25/33/40 80386SXLV-20/25 80386DXLV-25 80486DXLV-33 80486SXLV-33
Networking – Disk Control – Memory Management – Laser Printers – Ethernet 10BASE-T	80186/88 80186/88

High-Performance Bus Interface



Introduction

High-Performance Bus Interface

AMD's new CMOS 29C800A Family is the latest offering in this AMD-invented market. These products have the fastest useable speed in the industry. This is accomplished via proprietary-controlled edge rate outputs which offer the lowest ground bounce of any 48 mA bus interface family. 29C800A interface products also have the lowest power consumption available. Functions offered are registers, latches, buffers, transceivers, parity transceivers, and pipeline registers.

The Multiple Bus Exchange (MBE) family consists of digital cross point switches which enable easy interfacing of buses in multiple bus systems. The newest members of this family have worst case port-to-port delays of 10 ns. All outputs drive 48 mA with proprietary low ground bounce circuitry. MBEs are particularly useful in the following system applications:

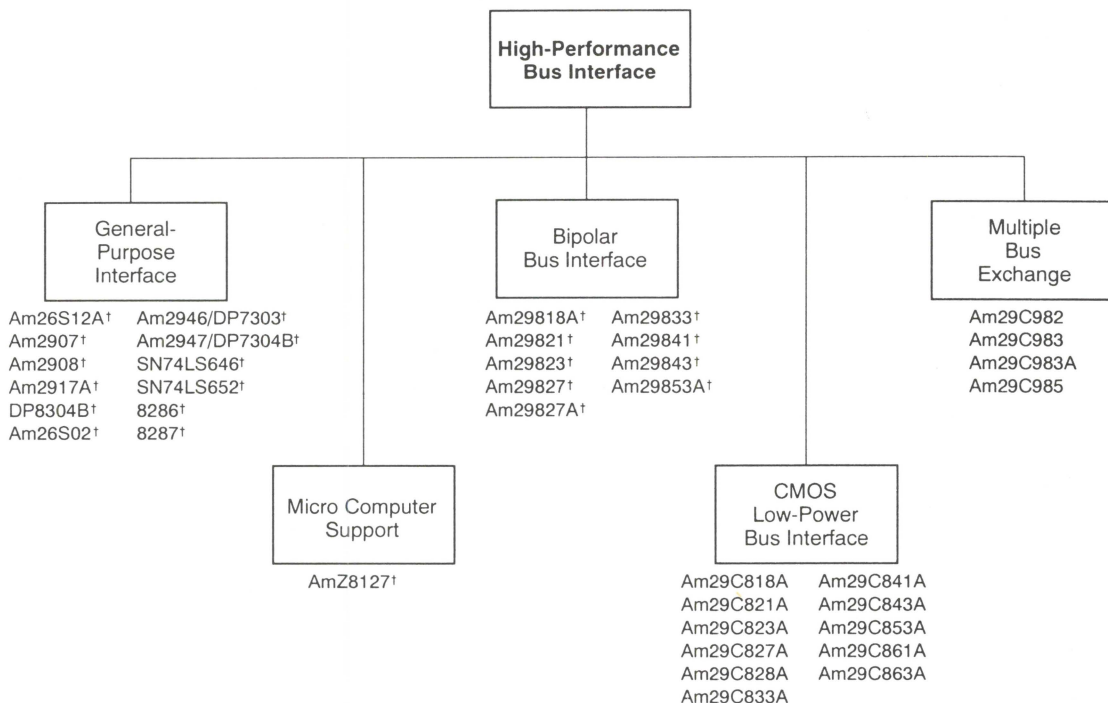
- PCs with Cache Memories
- RISC memory systems
- Multiprocessing systems
- Telecommunications

Features

- Low ground bounce interface
- Multiple bus communication

Benefits

- Easier interface in high performance designs
- Cost/Board space savings

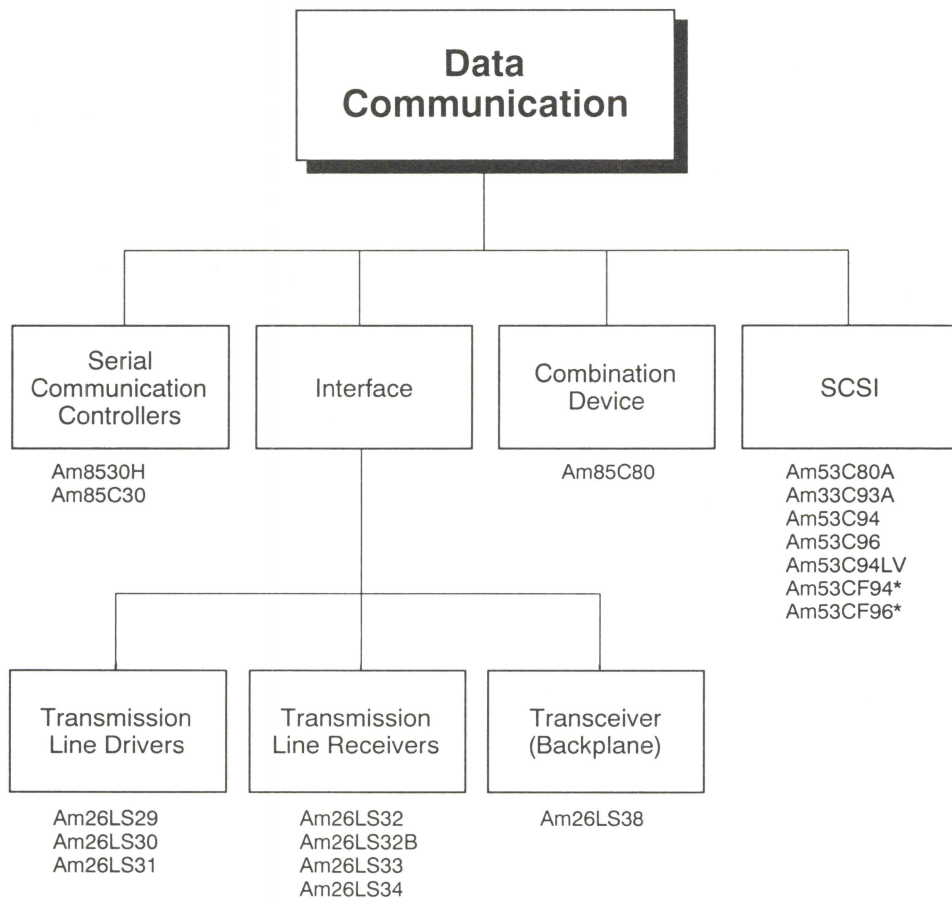


Part Number	Description	Part Number	Description
High-Performance Bus Interface		Micro Computer Support	
General-Purpose Interface		Bipolar High-Performance Bus Interface	
Am26S12A†	Quad Transceiver, V_{HYS} (Receiver) = 1.05 V	AmZ8127†	Z8000 System Clock Generator
Am2907†	Quad Transceiver with Three-State Receiver Parity	Am29818A†	8-Bit Diagnostic Register
Am2908†	Quad Transceiver with Three-State Receiver and Parity (DEC Comp)	Am29821†	10-Bit Register
Am2917A†	Quad Transceiver with Three-State Receiver and Parity	Am29823†	9-Bit Register
DP8304B†	Octal Three-State Bidirectional Transceiver	Am29827/827A†	10-Bit Buffer
Am26S02†	Schottky Dual One-Shot	Am29833A†	Parity Bus Transceiver with Register
Am2946/DP7303†	Octal Three-State Bidirectional Transceiver; Inverting	Am29841†	10-Bit Latch
Am2947/DP7304B†	Octal Three-State Bidirectional Transceiver; Non-Inverting	Am29843†	9-Bit Latch
SN74LS646†	8-Bit Bus Front-Loading Latch Transceiver; Non-Inverting	Am29853A†	Parity Bus Transceiver with Latch
SN74LS652†	8-Bit Bus Front-Loading Latch Transceiver; Non-Inverting		
8286†	Octal Bus Transceiver; Non-Inverting		
8287†	Octal Bus Transceiver; Inverting		

†Not recommended for new designs.

Part Number	Description	Part Number	Description
High-Performance Bus Interface (cont.)		Am29C843A	CMOS 9-Bit Latch
CMOS Low-Power Bus Interface (Improved performance, 48 mA drive, reduced ground bounce with low power consumption)		Am29C853A	CMOS Parity Bus Transceiver with Latch
Am29C818A	CMOS 8-Bit Diagnostic Register	Am29C861A	CMOS 10-Bit Bidirectional Transceiver
Am29C821A	CMOS 10-Bit Register	Am29C863A	CMOS 9-Bit Bidirectional Transceiver
Am29C823A	CMOS 9-Bit Register	Multiple Bus Exchange	
Am29C827A	CMOS 10-Bit Buffer	Am29C982	4-Bit x 4-Port Multiple Bus Exchange
Am29C828A	CMOS 10-Bit Buffer (Inverting)	Am29C983	9-Bit x 4-Port Multiple Bus Exchange
Am29C833A	CMOS Parity Bus Transceiver with Register	Am29C983A	9-Bit x 4-Port Multiple Bus Exchange, High Speed
Am29C841A	CMOS 10-Bit Latch	Am29C985	9-Bit x 4-Port Multiple Bus Exchange with Parity

Data Communication Products



*In development

Introduction

AMD offers a complete line of Data Communications products which allow CPU hosts to communicate with peripherals using various industry standard protocols. AMD's Data Communications product family includes Small Computer System Interface (SCSI) Controllers, Serial Communications Controllers (SCC), Combination devices containing both SCC and SCSI blocks, and Interface Line Drivers and Receivers.

The Am53CF94 and Am53CF96 Enhanced SCSI-2 (ESC) controllers are plug-in replacements for the industry standard 53CF94 and 53CF96, respectively. The ESC controller supports fast SCSI-2 transfer up to 10 Mbytes/sec in synchronous mode and up to 7 Mbyte/sec in asynchronous mode. It conforms to ANSI SCSI-2 specifications. The ESC controller also supports scatter-gather or back-to-back synchronous data transfers. AMD's proprietary features such as power-down mode for the SCSI transceivers, programmable GLITCH EATER, Active Negation, and extended Target command set are also included for improved performance.

The low voltage controller Am53C94LV operates at a power saving 3.3 V and is ideal for the notebook computing environment. The SCSI controller is offered in a PQFP package and is functionally identical to the Am53C94.

The Am53C94 and Am53C96 High Performance SCSI Controllers (HPSC) are plug-in replacements for the industry standard 53C94 and 53C96, respectively. The HPSC has a flexible three bus architecture. It has a 16 bit DMA interface, an 8 bit host data interface and an 8 bit SCSI data interface. The HPSC is designed to minimize host intervention by implementing common SCSI sequences in hardware. An on-chip state machine reduces protocol overheads by performing the required sequences in response to a single command from the host. Many SCSI-2 features are supported including Selection, Reselection, and Disconnection commands, which are directly supported.

The Am53C80A first generation SCSI device has been improved by AMD with the addition of AMD's patented GLITCH EATER™ circuitry.

The GLITCH EATER circuitry is implemented also on the ACK and REQ lines of the Am53C94, Am53C96, Am53CF94, Am53CF96 and Am53C94LV. The circuitry improves system reliability by filtering out glitches on the ACK and REQ lines.

Due to a popular move towards SCSI, AMD has second-sourced Western Digital's 33C93A second generation SCSI controller, enhancing it by fabricating the device on a submicron CMOS process technology. The Am33C93A is the only second sourced SCSI controller in this category, allowing peripheral and host system manufacturers to build state-of-the-art systems, at low cost, while taking advantage of the controller's 5MByte/second synchronous transfer rate.

The Am8530H is the first generation of the serial communication controller family. It is designed for the use with the 8- and 16-bit microprocessors. The SCC is dual-channel and can be software configured to satisfy a wide variety of serial communication applications.

The Am85C30 ESCC is a high performance version of the industry-standard 8530 architecture. AMD's version incorporates enhancements which make CPU interfacing much easier, reducing software overhead, and increasing performance. As a result, the Am85C30 has become an industry standard serial interface on engineering workstations and many other high performance platforms.

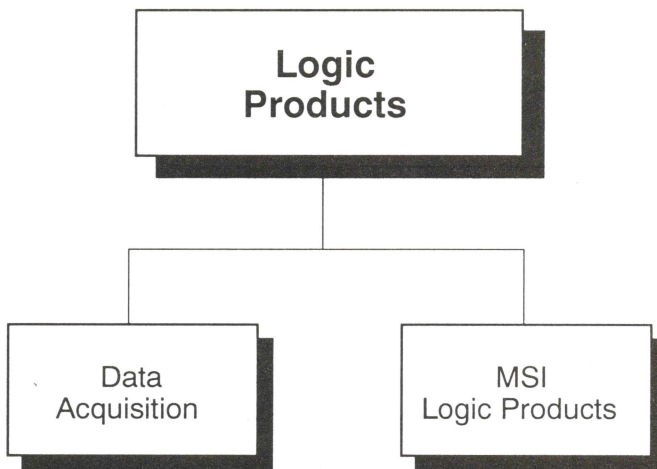
The Am85C80 Combination SCSI/SCC Controller is a unique device which incorporates an Am85C30 SCC and an Am53C80A SCSI on ONE CHIP. This integration allows designers using both of these I/O functions to save valuable board space, power consumption, and manufacturing cost. Additionally, due to its fully-static CMOS design, the Am85C80 may be "put to sleep" when used with battery-powered systems, allowing a power consumption reduction of over 2000X, as compared with using two separate components.

AMD is the industry's leading supplier of standard interface devices including transmission line receivers, line drivers and backplane transceivers.

Part Number	Description	Part Number	Description
Serial Communication Controllers		Combination SCSI/SCC	
Am8530H	Serial Communication Controller	Am85C80	CMOS SCSI/SCC Combo Chip
Am85C30	CMOS Serial Communication Controller		
Interface		SCSI	
Transmission Drivers		Am53C80A	CMOS SCSI Interface Controller (NCR Alternate Source)
Am26LS29	Quad RS-423 Line Driver	Am33C93A	Enhanced CMOS SCSI Controller (Western Digital Second Source)
Am26LS30	Quad RS-422/423 Driver	Am53C94	High-Performance CMOS SCSI Controller (Single-Ended; NCR Alternate Source)
Am26LS31	Quad RS-422 Line Driver		
Transmission Line Receivers		Am53C96	High-Performance CMOS SCSI Controller (Single-Ended and Differential; NCR Alternate Source)
Am26LS32	Quad RS-422 Line Receiver	Am53C94LV	Low Voltage High-Performance CMOS SCSI Controller in PQFP Package
Am26LS32B	Quad RS-422/423 Line Receiver	Am53CF94*	CMOS Enhanced SCSI-2 Chip (Emulex FAS216 Alternate Source; NCR Alternate Source)
Am26LS33	Quad High Vcm Line Receiver		
Am26LS34	Quad Parity Line Receiver	Am53CF96*	CMOS Enhanced SCSI-2 Chip (Emulex FAS236 Alternate Source; NCR Alternate Source)
Transceiver (Backplane)			
Am26LS38	Quad Differential Backplane Transceiver		

*In development

Logic Products



Introduction

Data Acquisition

The AMD Data Acquisition family consists of high speed voltage comparators and A/D and D/A converters.

The comparators are ideal for applications requiring low level signal detection at high speeds while maximizing gain and bandwidth.

The A/D and D/A converters are available in 8- and 12-bit widths and offer a variety of features, from precision voltage reference to microprocessor compatibility. Applications include I/O subsystems, process control, and servo-control.

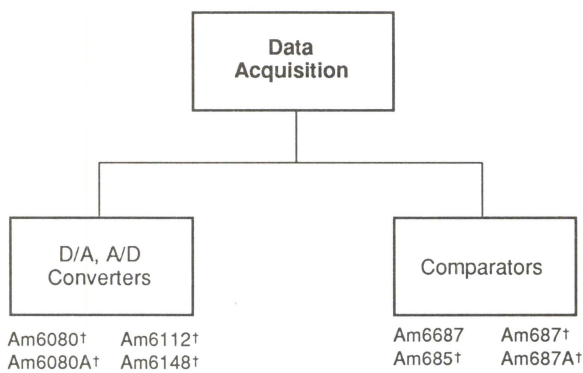
MSI Logic Products

The Medium Scale Integration products consist of registers, counters, and general logic products.

The registers are from a variety of families and, as such, offer a variety of features and functions, including successive approximation, and Quad, or Octal organizations.

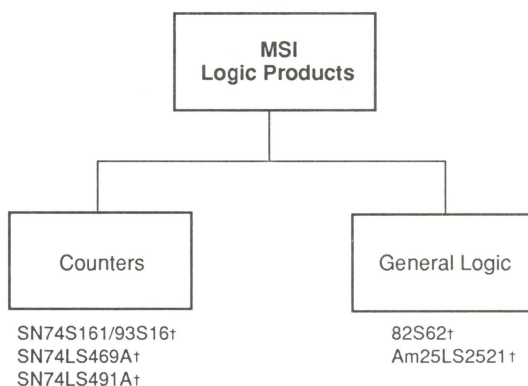
The counters are available in 4-, 8-, and 10-bit configurations.

General logic products also include a variety of other functions, such as parity generation/checkers, comparators and multipliers.



Part Number	Description	Part Number	Description
Data Acquisition		Comparators	
D/A, A/D Converters		Comparators	
Am6080†	Microprocessor-Compatible 8-Bit High-Speed Multiplying D/A Converter	Am6687	Ultra-High-Speed ECL Dual Voltage Comparator
Am6080A†	Microprocessor-Compatible 8-Bit Very High-Speed Multiplying D/A Converter	Am685†	High-Speed ECL Voltage Comparator
Am6112†	3 μs Microprocessor-Compatible Monolithic 12-Bit A/D Converter	Am687†	High-Speed ECL Dual Voltage Comparator
Am6148†	Microprocessor-Compatible 8-Bit A/D Converter	Am687A†	Very-High-Speed ECL Dual Voltage Comparator

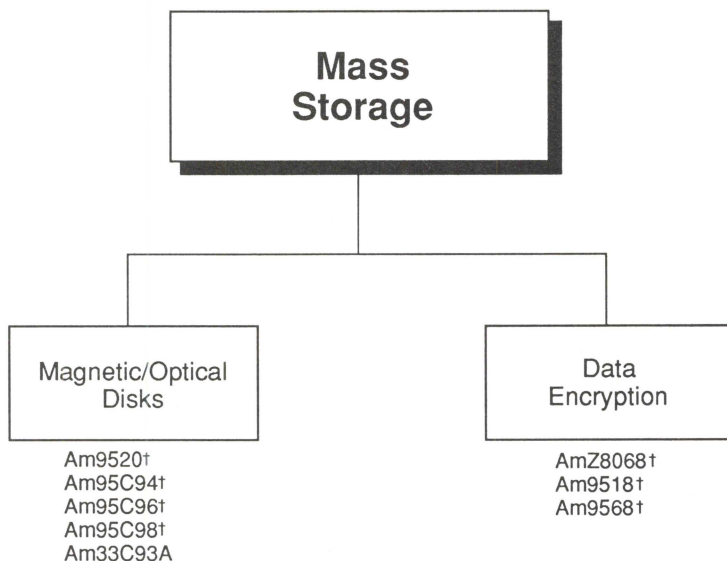
† Not recommended for new designs.



Part Number	Description	Part Number	Description
MSI Logic Products			
Counters		General Logic	
SN74S161/93S16†	IC BIP Counter	82S62†	Schottky 9-Input Parity Checker/Generator
SN74LS469A†	8-Bit Up-Down Counter	Am25LS2521†	8-Bit Equal to Comparator
SN74LS491A†	10-Bit Counter		

†Not recommended for new designs.

Mass Storage



Introduction

Mass Storage

AMD's Mass Storage solution aims at today's markets. The second generation Optical Chipset consisting of the Am95C98 Integrated Optical Disk Controller (IODC), Am95C94 (ABEP) and Am33C93A (SCSI) delivers high integration while consistent with X3B11 Optical Standards. The IODC integrates the Am95C96 Optical Disk Controller and a 2,7 Run Length Limited encoder/decoder onto one chip. The IODC offers higher integration and lower cost. AMD's first generation Optical Chipset consisting of the Am95C96 (ODC), Am95C94 (ABEP) and Am33C93A also supports the X3B11 Optical Standards. These high performance chipsets utilize a sophisticated Reed-Solomon engine (ABEP) for syndrome generation and correction of optical media's errors. Due to a popular move towards SCSI, Western Digital's second-sourced Am33C93A combines all of the advantages of second-generation SCSI 1 together with AMD's state-of-the-art 1-micron CMOS process.

Features

- Highest performance solution
- Complete software and development tool support
- High speed/Transfer rate
- Implements industry standard

Benefits

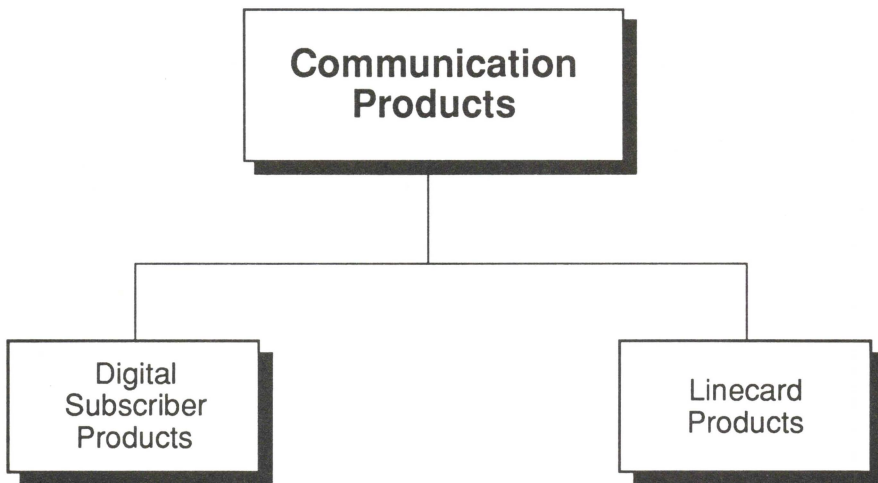
- Evaluation boards and designs available
- Low cost
- Short time to market due to the chipset's self containment and integration

Part Number	Description	Part Number	Description
Mass Storage			
Magnetic/Optical Disks		Data Encryption	
Am9520†	Burst Error Processor	AmZ8068†	Data Ciphering Processor
Am95C94†	Advanced Burst Error Processor	Am9518†	Data Ciphering Processor
Am95C96†	Optical Disk Controller	Am9568†	Data Ciphering Processor
Am95C98†	Integrated Optical Disk Controller	Evaluation Tools	
Am33C93A	CMOS SCSI Chip (Western Digital Second Source)	Am95C96EVAL8	EVAL—SCSI to ESDI Bridge Controller, 80188 based

† Not recommended for new designs

NETWORKING AND COMMUNICATION PRODUCTS

Communication Products



Introduction

Advanced Micro Devices' broad range of communication products are the tools needed to produce equipment for the World Network. AMD has long been recognized as one of the largest suppliers of IC-based telecom solutions. A particularly strong product area is that of highly integrated ICs based on optimized signal processors. AMD has shipped over 60 million ICs of this type for telecom applications worldwide!

AMD's linecard product family for the "POTS" telephone network has long been recognized as a leader. Together, these SLIC and DSLAC products provide all the functions required by an analog linecard. In addition, their characteristics are programmable. This allows a single linecard design to meet the requirements of many worldwide standards and markets, streamlining manufacturing and lowering costs.

AMD's highly integrated ISDN terminal product, the Am79C30A is the most cost effective solution available for ISDN voice-only or voice + data terminals. The Am79C32 provides a similar level of integration for data-only terminals.

The first member of AMD's new family of wireless telephone products is the Am79C410 CT2 PhoX™ Controller. The PhoX Controller incorporates all the baseband functions required by a CT2 digital cordless telephone, and should substantially lower the cost and improve the time to market of CT2 telephone designs!

An AMD product is more than just a chip. The total product concept works synergistically to provide you with optimal design flexibility, cost, reliability, and time to market.

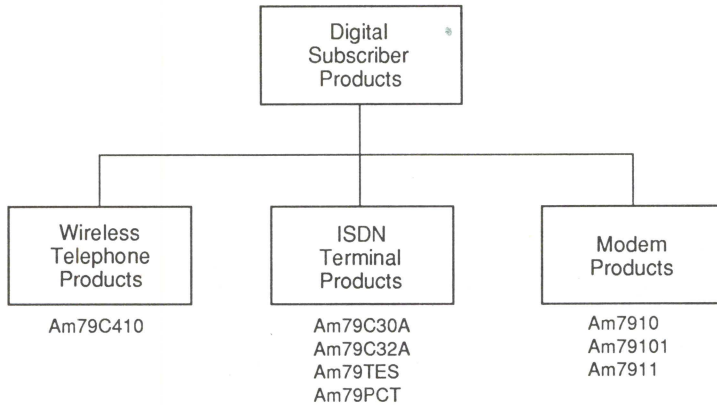
Software is also an important part of AMD's communication product offering.

For Central Office and PBX linecard applications, AmSLAC™ coefficient development software simplifies the task of software development for the linecard.

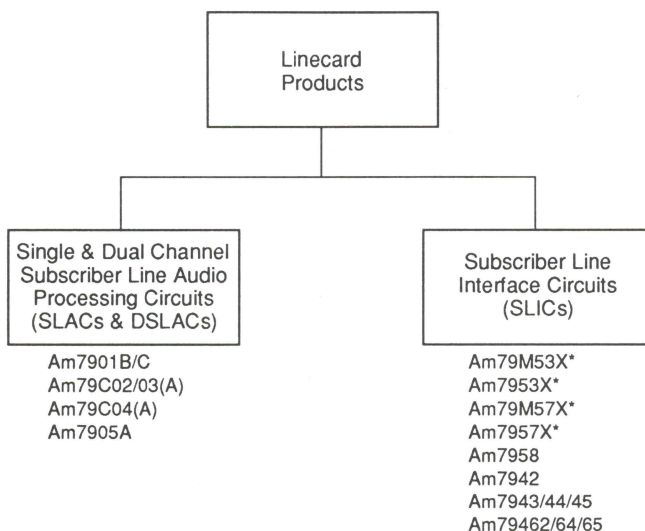
There's also evaluation software to assist you in learning about, exercising, and demonstrating distinctive features of selected ICs. Design time is greatly reduced when you use this software to study and evaluate components.

Together with the evaluation software we offer a complete set of evaluation boards that allow you to demonstrate functions, measure key specifications and reduce design time. Most of these boards operate in a PC environment, eliminating the need for expensive dedicated development systems.

Development boards, like the Am79TES, do more than demonstrate functions. The Am79TES allows you to start working with an ISDN design immediately. We even provide the schematics.



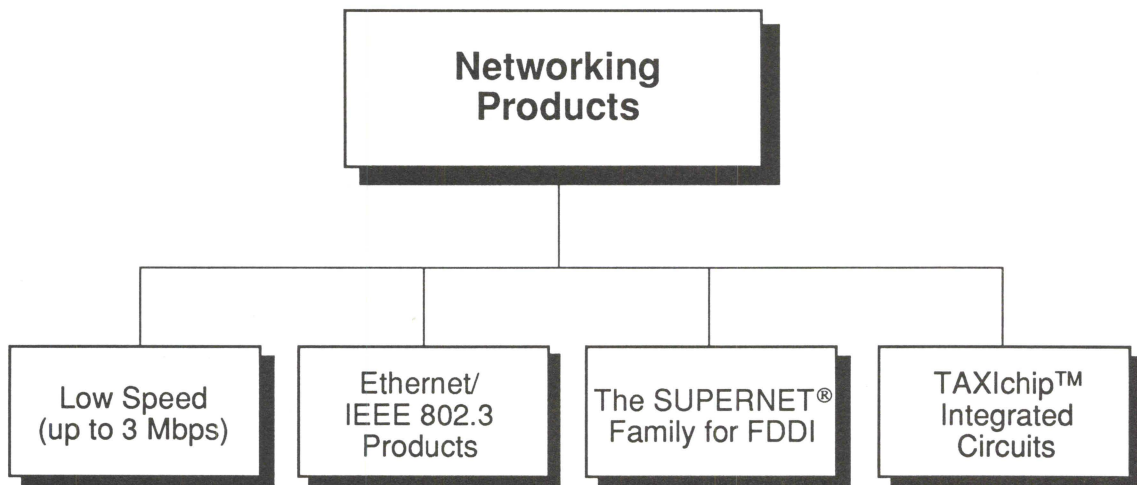
Part Number	Description	Part Number	Description
Digital Subscriber Products			
Wireless Telephone Products			
Am79C410	The Am79C410 CT2 PhoX Controller incorporates all of the baseband functions required to support CT2 digital cordless telephones, including full analog I/O support, ADPCM compression, noise suppression, CT2 CAI protocol formatter with receive signal strength indicator, 80C51 series microcontroller, and a complete set of system control and user interface functions. It features extremely low power consumption for extended battery life through 3 V operation and advanced power management.	Am79TES	The Terminal Equipment "S" Interface board is an intelligent 80186-based plug-in card for PC-XTs/PC-ATs. It is designed to run AmLink3 software and provide an evaluation/development environment for Am79C30A, Am2085, Am2110 and Am8252 applications.
ISDN Terminal Products		Am79PCT	The Power Compliant Telephone is an ISDN telephone design based on the enhanced Am79C30A Digital Subscriber Controller and an 80C51 microcontroller. It provides customers with a compact phone design that is fully compliant with CCITT power requirements and a development environment for ISDN software based on the 8051 family of microcontrollers.
Am79C30A	The Am79C30A Digital Subscriber Controller™ (DSC™) is a highly integrated ISDN "S" interface device. The Am79C30A combines an S-interface transceiver, a D-channel data-link controller, and an audio codec/filter to support both voice and data applications in a single chip.	Modem Products	
Am79C32A	The Am79C32A is a data-only functional subset of the Am79C30A.	Am7910	FSK Modem for switched network applications. Bell 103 and 202, CCITT V.21 and V.23.
		Am79101	Auto-dial, Auto-answer FSK Modem includes all Am7910 features, plus DTMF generation, call progress tone and answer tone detection, and an integral four-to-two wire hybrid.
		Am7911	FSK Modem for switched network or leased lines and telex. Bell 103 and 202, CCITT V.21 and V.23 and R.20 (Telex).



Part Number	Description	Part Number	Description
Line Card Products			
SLACs & DSLACs			
Am7901B/C	Subscriber Line Audio-Processing Circuit (SLAC) software-programmable DSP codec-filters support multiple line termination characteristics. Programmable DSP filters for ± 12 db gain, impedance matching, trans-hybrid balance, and equalization.	Am7942	A SLIC version for PBX applications. In addition to the features of the Am7953X/57X devices it operates over a battery voltage range of -19 V to -56.5 V and meets EIA/TIA RS464-B.
Am79C02/03 (A)	The Dual Subscriber Line Audio-Processing Circuit offers all the advantages of the SLAC plus improved filters and adaptive balance. The DSLAC™ device integrates two channels on a single low power CMOS IC. The 79C03 (A) is a reduced pin-count version of the 79C02 (A).	Am7943/44/45	Programmable constant current feed SLICs for DLC, PABX and Fiber to the Curb/Home applications. These non-switching regulator SLICs feature an on-chip Thermal Management (TMG) pin to reduce power on-chip; lower power standby mode (35 mW); and a low voltage relay driver with on-chip zener snubber. Polarity reversal option available if required. Meets the U.S. DLC TR-TSY-00057 requirements.
Am79C04/A	IOM2 version of the 79C02.	Am79462/64/65	Programmable constant resistance and constant current feed SLICs. All three devices are non-switching regulator SLICs. The Am79462/64 devices are pin compatible to Ericsson's PBL3762/64. The Am79465 is similar to the Am79464 except the RSG pin is replaced with the CAS pin which allows the open circuit voltage to track the battery voltage.
Am7905A	24-Pin version of the 7901B.	Evaluation	Evaluation boards and associated software Boards are available for most of AMD's linecard products. A user-friendly PC-based interface is used to control the evaluation setups.
SLICs			
Am7953X/57X*	Subscriber Line Interface Circuits (SLICs) are highly integrated monolithic solutions that allow more compact linecards and lower costs by integrating the medium voltage BORSHT functions (Battery feed, Over-voltage protection, Ringing, Supervision, Hybrid, Test).		
Am7958	SLIC version designed to comply with North American LSSGR central office requirements.		
Am79M53X/M57X*	SLIC versions that support metering applications. Include the same features as the Am7953X/57X devices, and allow the injection of a metering pulse up to 2.2 Vrms from the four-wire side.		

* X indicates one of various feature sets available, e.g., Am79573.

Networking Products



Introduction

Within the World Network are many Local Area Networks. Local Area Network standards such as FDDI, and Ethernet/ IEEE 802.3 allow multiple users to share computing power and applications. These networks use twisted-pair, coax or fiber-optic cable to link equipment. AMD supplies the chip-set solutions necessary for easy implementation of these standards. Additionally, devices like AMD's TAXIchip set provide physical layer interface solutions for general-purpose high-speed point-to-point communications over a variety of media. The Network Products division is committed to providing you with complete data communication solutions.

The SUPERNET Family for FDDI

Fiber Distributed Data Interface (FDDI) is a new 100-Mbps fiber-optic LAN standard approved by ANSI and ISO. It consists of two counter-rotating rings of optical fiber that can connect up to 500 nodes with a ring circumference of up to 100 kilometers. The primary ring is used for data transmission. The secondary ring can also be used for data transmission or may serve as a backup ring.

AMD, the leader in FDDI products, provides a complete system solution ranging from chip-sets to FDDI development boards. The first commercially available integrated FDDI solution, the SUPERNET® chip-set, was introduced in December of 1988. Since then the SUPERNET chip-set has outpaced all competitors and established itself as the dominant FDDI solution in the market. The five-chip solution implements the Media Access protocol (MAC) and the Physical Layer protocol (PHY) of the FDDI standard as well as the buffer management functions.

In January 1991, AMD announced the next generation FDDI solution, the SUPERNET 2 chip-set. SUPERNET 2 combines the industry's most-highly integrated Media Access Controller, FORMAC Plus, and a new, low-power physical layer solution, the AmPHY. The highly integrated four-chip solution saves board real estate and reduces power consumption by more than 50 percent over the first generation solution. Like the first generation chip-set, SUPERNET 2 is a complete system solution, employing a mixture of state-of-the-art CMOS and bipolar technologies.

The FASTcard™ 2 development kit is a PC-AT based dual attachment station (DAS) set utilizing the SUPERNET 2 solution. The set consists of two board types: a DAS board and a 4-port master port (MP) board. Up to three MP boards can be used with the DAS board to configure a 4-port, 8-port or 12-port concentrator. The FASTcard 2 is supported by FDDINET 2 and pDEMO 2.

TAXIchip Set

The Transparent Asynchronous XCVR Interface (TAXI™) is a point-to-point communication link for building high-speed data channels. Operating with data rates up to 140 Mbps, TAXI is at least ten times faster than conventional RS-422 line drivers and receivers and is well suited for point-to-point applications ranging beyond video speeds.

For high-speed applications, no other vendor offers an integrated communications solution with the features of our TAXIchip set. It operates much like a single parallel latch: data is loaded into one side and read from the other, except

that the second side is separated by a long serial link. It replaces bulky and expensive parallel ribbon cables with a single more reliable serial link. With the TAXIchip set, you choose the interface best suited for your equipment: twisted pair, direct coaxial cable interface or fiber-optic cable using optical data transceivers.

Ethernet/Cheapernet/IEEE 802.3

The Am799X chip set is a total hardware solution for implementing a complete interface module (node) for an Ethernet network. The Am79C90 CMOS Local Area Network Controller for Ethernet (C-LANCE), Am7992B Serial Interface Adapter (SIA), and Am7996 Ethernet/Cheapernet/IEEE 802.3 Transceiver were designed to work together to ensure optimum performance and compatibility. Being the first one to offer a completely integrated Ethernet chip set in 1985, AMD offers security and confidence as a major Ethernet Integrated Circuit manufacturer coming from years of proven success. The 79C90 CMOS Local Area Network Controller for Ethernet (C-LANCE) is pin, function, and software compatible with the industry standard 7990 LANCE device. The C-LANCE consumes just 20% of the power required for the LANCE device and eliminates all errata.

AMD's Ethernet commitment continues with products that include a second-generation Ethernet controller—the Am79C900 and a 10BASE-T transceiver—the Am79C98. The Am79C900 combines the controller and encoder/decoder functions into one 32-bit chip using CMOS technology, offering high integration along with lower power consumption. The Am79C98/100 and Am79C980 offer users the ability to implement 802.3/Ethernet over twisted pair cabling. The two devices are designed using CMOS technology and will offer IEEE 802.3 10BASE-T compliance. The Am79C100 TPEX Plus is similar to the TPEX, but has more LED drivers and extended line transmit and receive capabilities.

AMD, the leader in non-managed repeater applications with the IMR (Am79C980) chip, now provides an easy upgrade path to build a fully managed product based on the IEEE 802.3 Layer Management for 10 Mb/s Baseband Repeaters ("Repeater Management") Standard. The new highly integrated, Hardware Implemented Management Information Base™ (HIMIB™) (Am79C987) device interfaces directly with the IMR+ (Am79C981) chip, an enhanced IMR device. This allows designers to build a fully managed repeater product. The Am79C981 will replace the Am79C980.

The Am79C940 (MACE) is an integrated Ethernet LAN Controller comprising a 16-bit slave host interface, an IEEE 802.3 MAC, an encoder/decoder, a 10BASE-T transceiver, and an AUI port.

The Am79C960 (PCnet-ISA™) is a fully integrated, single chip, Ethernet controller. The PCnet-ISA has six internal functional blocks:

- Glueless Interface to an ISA Bus
- Buffer Memory Management Unit, (Similar to the LANCE)
- IEEE 802.3 MAC
- Encoder/Decoder
- 10BASE-T Transceiver
- AUI Port

A complete suite of software drivers is available, as well as an ISA hardware platform. PCnet-ISA offers the lowest cost Ethernet solution for the PC adapter card and PC mother-board applications.

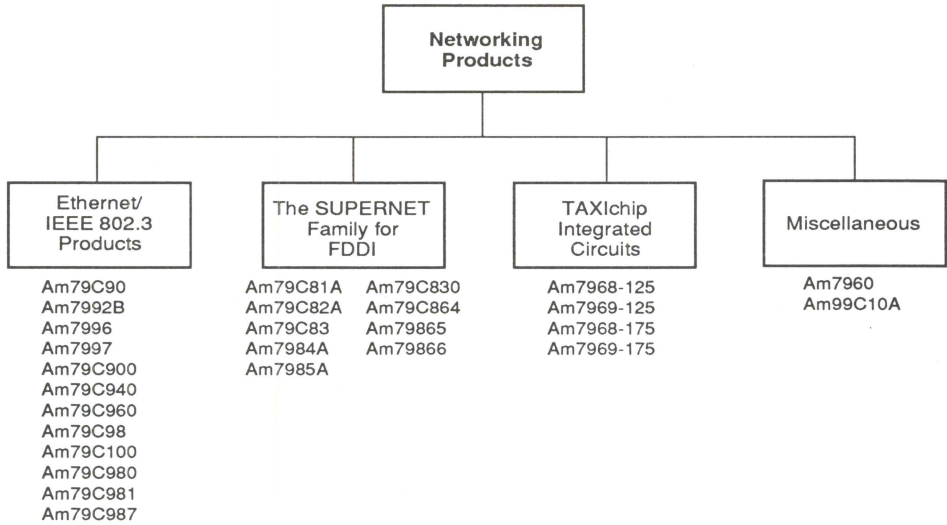
New Products to be Introduced

To save time and complications of developing your own Ethernet proto-type designs, AMD offers several evaluation kits. The C-LANCE-AT-KT is a PC/AT card that implements an Ethernet node based on the industry standard Am79C90 C-LANCE. This kit comes complete with a programmer's monitor/debugger for software development, as well as a Novell compatible driver that allows the user to incorporate the kit into an existing Novell network. For designs utilizing the Am79C900, the ILACC-MAC-KT provides a full 32-bit evaluation platform. This kit is designed for use in the Apple Macintosh II family of computers, and like the C-LANCE-AT-KT, supports both Ethernet and Cheapernet. The ILACC-MAC-KT is based on the highly integrated Am79C900 32-bit Ethernet controller, with an on-board coax transceiver (Am7996). The ILACC-MAC-KT also contains the necessary identification ROM necessary for operation in the MAC II*, which is expandable to accommodate user code. On-board RAM completes the interface to the host. The ILACC-MAC-KT comes complete with a driver/monitor to explore and customize the programmable features of the Am79C900, which helps the system designer to become familiar with the Am79C900 and to write custom drivers in a shorter amount of time.

The ISA-HUB™ Kit is based on the Am79C981 (IMR+) and the Am79C987 (HIMIB) devices. This is fully compatible with the IEEE 802.3 Repeater Management Standard. It is a low cost modular design complete with Novell NMI driver support.

AMD also offers evaluation boards for the physical layer chips. The first of these is the Am7996EVAL-HW, an evaluation kit for the Am7996 IEEE 802.3 compatible Ethernet coaxial cable transceiver. The evaluation kit consists of a 3 x 3 inch stand-alone Ethernet transceiver application which integrates the popular Am7996 transceiver chip along with external components and a DC-DC converter into an optimized PC board layout. The board interfaces to an Ethernet controller via the standard 15-pin Attachment Unit Interface (AUI), and directly connects to a 10BASE-2 (Cheapernet) network via a BNC coaxial connector.

Finally, the Am79C98EVAL-HW helps the network designer develop hardware for the new 10BASE-T (Twisted Pair Ethernet) standard. This evaluation kit utilizes the Am79C98 10BASE-T transceiver chip to connect an Ethernet controller (via the AUI connector) to a twisted pair Ethernet LAN via a standard RJ45 connector. A twisted pair network allows the user to take advantage of the reduced wiring costs and simplified network management features inherent to 10BASE-T. The Am79C98 performs all necessary functions required by the IEEE 802.3 spec while providing a high level of integration. This stand-alone transceiver implementation is capable of immediate connection to an existing 10BASE-T Ethernet LAN.



Part Number	Description	Part Number	Description
Networking Products			
Ethernet/IEEE 802.3 Products (10 Mbps)		The SUPERNET Family for FDDI (100 Mbps)	
Am79C90	CMOS Local Area Network Controller for Ethernet/Cheapernet (C-LANCE)	SUPERNET 1	
Am7992B	Serial Interface Adapter (SIA)	Am79C81A	RAM Buffer Controller (RBC)
Am7996	Ethernet/Cheapernet/IEEE 802.3 Transceiver	Am79C82A	Data Path Controller (DPC)
Am79C900	32-Bit Integrated Local Area Communications Controller™ (ILACC™)	Am79C83	Fiber Optic Ring Media Access Controller (FORMAC)
Am79C940	16-Bit Ethernet Controller Including SIA and TPEX	Am7984A	ENcoder DECoder (ENDEC)
Am79C960	PCnet-ISA™ Single-Chip Ethernet Controller for ISA	Am7985A	ENDEC Data Separator (EDS)
Am79C98	10BASE-T Transceiver (TPEX)	SUPERNET 2	
Am79C100	10BASE-T Transceiver (TPEX Plus)	Am79C830A	FORMAC Plus (FORMAC with integrated DPC and RBC)
Am79C980	10BASE-T Integrated Multiport Repeater (IMR)	Am79C864	Physical Layer Controller (PLC)
Am79C981	Enhanced 10BASE-T Integrated Multiport Repeater (IMR+)	Am79865	Physical Data Transmitter (PDT)
Am79C987	Hardware Implemented Management Information Base (HIMIB)	Am79866	Physical Data Receiver (PDR)
		Miscellaneous	
		Am7960	Coded Data Transceiver
		Am99C10A	Content Addressable Memory (CAM)

Part Number	Description	Part Number	Description
Networking Products (cont.)		Evaluation Tools (cont.)	
TAXIchip Integrated Circuits			
Am7968-125	125 MHz TAXIchip Transmitter	AmFDDI-PC-DAS	FASTcard 2 (SUPERNET 2) Evaluation Board
Am7969-125	125 MHz TAXIchip Receiver	Am FDDI-PC-MP	4-Port Master Port Board (for use with FASTcard 2)
Am7968-175	175 MHz TAXIchip Transmitter	AmFDDI-PC-CON	Concentrator Board Set (One FASTcard 2, One MP Board)
Am7969-175	175 MHz TAXIchip Receiver	AmFDDI-NET-2	Source Code (MAC drivers and SMT) for FASTcard 2 and MP Boards
Evaluation Tools		AmTAXIEVAL1	TAXI MINIcab Evaluation Board. Available Operating Frequency: 40-175 MHz. Can Utilize AMD or BT&D FOXI Devices.
C-LANCE-AT-KT	IBM PC-AT Ethernet/Cheapernet Evaluation Board for the C-LANCE	AmTAXICRC/C	CRC Board with BNC Connectors
ILACC-MAC-KT	Apple® MAC II Ethernet/Cheapernet Evaluation Board for ILACC	AmTAXICRC/F	CRC Board with 1300 nm Optical Data Links
Am7996EVAL-HW	Stand-Alone Transceiver Demo Board	AmTAXIFOB	TAXI 820 nm Fiber Optic Evaluation Board
Am79C98EVAL-HW	Stand-Alone 10BASE-T Transceiver Demo Board	AmTAXI-275EVAL	TAXI 275 Evaluation Board Utilizing Am79168 and Am79169 Chips with Coaxial and STP Interfaces and Space for Optical Transceivers
IMR-VELCRO-HW	Stand-Alone Eight Port 10BASE-T Repeater Evaluation Board		
ISA-HUB-KT	ISA-HUB, 10BASE-T Ethernet Managed Repeater Design		
PCnet-ISA-KT	PCnet-ISA Evaluation Kit with 10BASE-T Interface		
PCnet-ISA-KT/2	PCnet-ISA Evaluation Kit with 10BASE-T and 10BASE2 Interfaces		

PACKAGING INFORMATION

Packaging Information

Introduction

Today, as integrated circuits become more compact, the IC package has become an integral part of the products' overall performance. AMD provides built-in optimized chip/package combinations, keeping you on the leading edge of packaging technology. We offer a wide range of high-performance, state-of-the-art packaging solutions that are smaller, lighter, and adaptable to automated board assembly operations. These package designs enable manufacturers to produce compact, sophisticated systems at reduced costs.

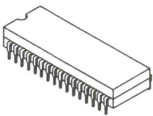
Our most recent package developments include fine lead-pitch packages that can accommodate the increased input/output connections required for our more complex devices. AMD's families of fine lead-pitch Plastic Quad Flat Pack (PQFP) and Ceramic Quad Flat Pack (CQFP; also called cerquads) packages provide reliable surface-mount package alternatives for high density devices. With Tape-Automated-Bonding (TAB), PQFP packages also can be used for those devices that could not otherwise be accommodated with conventional wire-bond techniques.

The Thin Small Outline Plastic (TSOP) package, developed for our EPROM and Flash memory products, helps you develop more compact designs in the memory card, laptop, notebook, and pocket computer markets. With a package thickness of only 1 mm (i.e., 40 mils), the TSOP is one-third to one-half as thick as the small outline and plastic leaded chip carrier packages.

Development of an 80-pin thin PQFP is underway for introduction later this year, providing a very low-profile, surface-mount package for high-density memory applications. AMD also is developing the capability for a plastic ball grid array package to be introduced in 1994.

The following tables describe the variety of package styles we offer, both through-hole and surface-mount. All packages fall within the JEDEC standard package outline dimensions unless otherwise noted. Alphabetic codes in our Ordering Part Numbers (OPNs) identify the package type for a particular device. The OPN package designators defined in the following tables apply to commercial, proprietary product only.

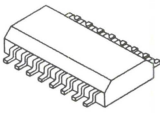
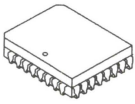

Plastic Package Types and Descriptions

OPN PACKAGE DESIGNATOR ¹	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
P	Plastic Dual-In-Line (MOLD DIP)	PD	Standard mil size ³ ; rectangular package; through-hole leads	PD 008, PD 010, PD 014, PD 016, PD 018, PD 020, PD 022, PD 024, PD 028, PD 032, PD 040, PD 048, PD 050, PD 052, PD 064
R ⁴	 (WIDE BODY)	PD3	Non-standard mil size (300 mil); rectangular package; through-hole leads	PD3022, PD3024, PD3028
		PD4	Non-standard mil size (400 mil); rectangular package; through-hole leads	PD4028
		PDW	Same as PD3 version except slightly wider package	PDW024, PDW028

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. OPNs for second-source products may not follow this coding depending on compatibility requirements with the proprietary source's OPN. For example, the current OPN for the Am8038DX family of products uses an "NG" as the package code for a PQFP package instead of a K (e.g., NG80386DX-25).
3. Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket. Standard mil sizes per package leadcount are: 8 through 20 pin = 300 mil; 22 pin = 400 mil; 24 through 48 pin = 600 mil; 50 through 64 pin = 900 mil.
4. Denotes that the package dimensions vary from the standard. This is device driven, as these options are not available for all devices.

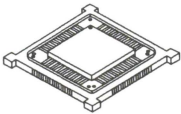
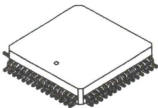
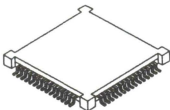
Plastic Package Types and Descriptions (*continued*)

OPN PACKAGE DESIGNATOR ¹	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
S	Plastic Small Outline (PLA SO GW) 	SO	Standard mil size ³ ; rectangular package; gull-wing leads	SO 020, SO 024, SO 028
		SO3	Standard mil size (300 mil); rectangular package; gull-wing leads	SO3016
		SO	Non-standard mil size (150 mil); rectangular package; gull-wing leads	SO 016
		SOH	Standard rectangular EIAJ package version; gull-wing leads	SOH 016
J	Plastic Leaded Chip Carrier (PLA LCC) 	PL	Standard square package, excluding 32-pin which comes only in a rectangular package; J-bend leads	PL 020, PL 028, PL 032, PL 044, PL 052, PL 068, PL 084
		PLH	Standard square package with a heat sink and J-bend leads	PLH028, PLH084
E	Thin Small Outline Plastic 	TS	Standard rectangular package; bi-directional, gull-wing leads; Pin-out is <i>standard</i>	TS 032 ⁴
F		TSR	Standard rectangular package; bi-directional, gull-wing leads; Pin-out is <i>reverse</i> .	TSR032 ⁴

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. OPNs for second-source products may not follow this coding depending on compatibility requirements with the proprietary source's OPN. For example, the current OPN for the Am8038DX family of products uses an "NG" as the package code for a PQFP package instead of a K (e.g., NG80386DX-25).
3. Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket. Standard mil sizes per package leadcount are: 8 through 20 pin = 300 mil; 22 pin = 400 mil; 24 through 48 pin = 600 mil; 50 through 64 pin = 900 mil.

Plastic Package Types and Descriptions (*continued*)

OPN PACKAGE DESIGNATOR ¹	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
K	Plastic Quad Flat Pack (FLAT PACK) 	PQR	Standard square package; trimmed and formed, quad-directional, gull-wing leads	PQR120 ⁷ , PQR144 ⁷ , PQR160 ⁴ , PQR168 ^{3,7} , PQR208 ^{6,7} , PQR216 ^{3,7}
			Standard rectangular package; trimmed and formed quad-directional, gull-wing leads	PQR080 ⁷ , PQR100 ⁷
U		PQB	Standard square JEDEC English package; trimmed and formed, quad-directional, gull-wing leads	PQB100 ^{5,6} , PQB132 ^{5,7} , PQB196 ^{5,6,7}
V		PQT	Very thin, standard square, JEDEC Metric package; trimmed and formed quad-directional, gull-wing leads	PQT080 ⁶

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. OPNs for second-source products may not follow this coding depending on compatibility requirements with the proprietary source's OPN. For example, the current OPN for the Am8038DX family of products uses an "NG" as the package code for a PQFP package instead of a K (e.g., NG80386DX-25).
3. Not yet JEDEC registered.
4. This is an EIAJ registered package, not JEDEC.
5. JEDEC English package (measured in inches); package body has corner bumpers.
6. Under development.
7. Also available in the TapePak® molded carrier ring upon customer request, in which case the customer trims and forms leads to meet their end-use specifications.

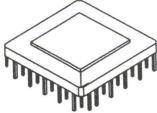
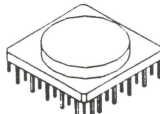
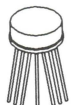
Hermetic Package Types and Descriptions

OPN PACKAGE DESIGNATOR ²	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
D	Ceramic Dual-In-Line (CER DIP)	CD	Standard mil size ³ ; rectangular package; through-hole leads	CD 008, CD 014, CD 016, CD 018, CD 020, CD 024, CD 028, CD 032 ⁴ , CD 040
		CDV	Standard mil size ³ ; rectangular package; window lid for uv-erasable devices; through-hole leads	CDV 020, CDV 024, CDV 028, CDV 032 ⁴ , CDV 040, CDV 042
C ⁴	(C.D. VIEW)	CD3	Non-standard mil size (300 mil); rectangular package; through-hole leads	CD3022 ⁴ , CD3024
		CDE	Non-standard mil size (300 mil); rectangular package; window lid for uv-erasable devices; through-hole leads	CDE024, CDE028
		CD4	Non-standard mil size (400 mil); rectangular package; through-hole leads	CD4022 ⁶ , CD4024, CD4028 ⁴
D	(TOP BRAZE)	TD	Standard mil size ³ ; rectangular package, top-brazed, through-hole leads; heat sink on the package body	TD 052 ⁴ , TD 064 ⁴
		TDX	Standard mil size ² ; rectangular package, top-brazed, through-hole leads; no heat sink	TDX052 ⁴ , TDX064 ⁴
D	Side Brazed Ceramic Dual-In-Line (SIDE BRAZE)	SD	Standard mil size ³ ; rectangular package; side brazed, through-hole leads	SD 008 ⁷ , SD 014, SD 016, SD 018, SD 020, SD 024, SD 028, SD 040, SD 048, SD 050, SD 052 ⁸
		SDV	Standard mil size ³ ; rectangular package; side-brazed, through-hole leads; window lid for uv erasable devices	SDV024, SDV028, SDV040
		SD3	Non-standard mil size (300 mil); rectangular package; side-brazed, through-hole leads	SD3022 ⁴ , SD3024
		SD4	Non-standard mil size (400 mil); rectangular package; side-brazed, through-hole leads	SD4028 ⁴ , SD4022 ⁶

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. Package codes in OPNs for second-source products may differ depending on compatibility requirements with the proprietary source's OPN. For example, the OPN for the Am8038DX family of products uses an "NG" to denote a PQFP package instead of a "K" (e.g., NG80386DX-25).
3. Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket. Standard mil sizes per package leadcount are: 8 through 20 pin = 300 mil; 22 pin = 400 mil; 24 through 48 pin = 600 mil; 50 through 64 pin = 900 mil.
4. Not listed in MIL-SPEC MIL-M 38510, application C.
5. Denotes that the package dimensions vary from the standard. This is device driven.
6. CD4022 and SD4022 are standard package sizes.
7. Not compliant with MIL STD 1835.
8. This 52-pin package is a non-standard 600-mil package, not the standard 900 mil.

Hermetic Package Types and Descriptions (*continued*)

OPN PACKAGE DESIGNATOR ²	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
G	Ceramic Pin Grid Array (CER PGA)  	CG	Standard, large outline, square package with through-hole leads; cavity down; with a heat sink.	CG 068, CG 120, CG 145, CG 155 ⁴ , CG 169
		CGX	Standard, large outline, square package with through-hole leads; cavity down; without a heat sink	CGX068, CGX120, CGX132 ³ , CGX145, CGX169
		CGY	Standard, large outline, square package with through-hole leads; cavity up; without a heat sink	CGY145, CGY068
		CGU	Standard, square small outline package body with through-hole leads; cavity up; without a heat sink	CGU068, CGU069, CGU085, CGU088
		CGA	Standard, square small outline package body with through-hole leads; cavity down; without a heat sink	CGA084, CGA088
H	Metal Can (METAL CAN) 	MC	Metal can with through-hole leads; small pin circle.	MC 008, MC 010
		MCW	Metal can with through-hole leads; wide pin circle.	MCW008

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. Package codes in OPNs for second-source products may differ depending on compatibility requirements with the proprietary source's OPN. For example, the OPN for the Am8038DX family of products uses an "NG" to denote a PQFP package instead of a "K" (e.g., NG80386DX-25).
3. Not compliant with MIL STD 1835.
4. Formally denoted by CGH155.

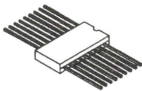
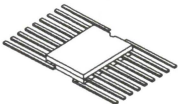
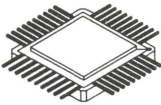
Hermetic Package Types and Descriptions (*continued*)

OPN PACKAGE DESIGNATOR ²	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
L	Ceramic Leadless Chip Carrier (CER LCC)	CL	Standard square package	CL 020, CL 028, CL 044, CL 052, CL 068, CL 084
		CLV	Standard square package; window lid for uv-erasable devices	CLV044
			Standard rectangular package; window lid for uv-erasable devices	CLV032
		CLT	Square package; thinner ceramic package body	CLT020, CLT024, CLT028, CLT044, CLT052 ⁴ , CLT068 ⁴
		CLW	Square package; thicker ceramic package body	CLW052 ⁴
	(LCC W/VIEW)	CLP	Standard square package with thermal pads	CLP020 ⁴ , CLP028 ⁴ , CLP044
		CA1	Standard Type A, square package; Opt. 1: electrical terminal connections on top and bottom of package	CA1068 ³
		CA2	Standard Type A, square package; Opt. 2: electrical terminal connections on top of package	CA2068 ³
		CA3	Standard Type A, square package; Opt. 3: electrical terminal connections on top of package; ceramic frit lid; thicker package	CA3068 ³
		CLR	Standard rectangular package	CLR018, CLR020, CLR 022 ³ , CLR028, CLR032
		CLH	Standard rectangular package with thermal pads	CLH032 ⁴

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. Package codes in OPNs for second-source products may differ depending on compatibility requirements with the proprietary source's OPN. For example, the OPN for the Am8038DX family of products uses an "NG" to denote a PQFP package instead of a "K" (e.g., NG80386DX-25).
3. Not listed in MIL STD 1835.
4. Not compliant with MIL STD 1835.

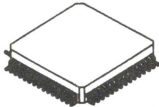
Hermetic Package Types and Descriptions (continued)

OPN PACKAGE DESIGNATOR ²	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
F	Ceramic Flat Pack (CER PACK) 	CF	Standard mil size ³ , rectangular, glass-sealed package; bi-directional, coplanar leads on two sides of the package	CF 010, CF 016, CF 020
			Standard mil size ³ , rectangular, glass-sealed package; bi-directional, coplanar leads on four sides of the package (<i>Spider leads</i>)	CF 014, CF 018 ⁴ , CF 022 ⁴ , CF 024, CF 028 ⁴
	(CER-PACK-S) 	CF4	Non-standard mil size (400-mil); glass-sealed, rectangular package; bi-directional, coplanar leads	CF4 016, CF4 018, CF4 020
		CFM	Medium mil size (larger than standard width), glass-sealed, rectangular package; bi-directional, coplanar leads	CFM 020, CFM 024, CFM 028
	(CER-PACK-L) 	CFL	Large mil size (larger than CF and CFM), glass-sealed, rectangular package; bi-directional, coplanar leads	CFL 020, CFL 024
		CFQ	Standard square, glass-sealed package; quad-directional, coplanar leads (50 mil lead-pitch)	CFQ 024 ⁴
		CFB	Standard mil size ³ , rectangular, laminated package ⁵ ; bi-directional, coplanar leads brazed to the bottom of the package	CFB 016, CFB 018 ⁴ , CFB 020, CFB 024, CFB 028
		CFT	Standard rectangular, laminated package ⁵ ; bi-directional, coplanar leads brazed to the top of the package	CFT 028 ⁴ , CFT 042 ⁴ , CFT 048 ⁴
			Standard square, laminated package ⁵ ; quad-directional, coplanar leads brazed to the top of the package	CFT 044, CFT 064 ⁴ , CFT 084

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. Package codes in OPNs for second-source products may differ depending on compatibility requirements with the proprietary source's OPN. For example, the OPN for the Am8038DX family of products uses an "NG" to denote a PQFP package instead of a "K" (e.g., NG80386DX-25).
3. Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket. Standard mil sizes per package leadcount are: 8 through 20 pin = 300 mil; 22 pin = 400 mil; 24 through 48 pin = 600 mil; 50 through 64 pin = 900 mil.
4. Not listed in MIL STD 1835.
5. These packages consist of several ceramic layers laminated together to form the package base, and a metal lid is hermetically glass-sealed over the die cavity.

Hermetic Package Types and Descriptions (continued)

OPN PACKAGE DESIGNATOR ²	PACKAGE TYPE	PHYSICAL DIMENSIONS PACKAGE ACRONYM	DESCRIPTION	PIN COUNT VARIATIONS ¹
F (Continued)	Ceramic Flat Pack  (CERQUAD)	CTQ	Standard square, laminated package ⁸ ; coplanar, quad-directional leads brazed to the top of the package (≤ 25 mil or ≤ 0.65 mm fine lead-pitch)	CTQ164 ^{4,7}
		GQD	Standard square, laminated package ⁸ ; quad-directional, gull-wing leads (≤ 25 mil or ≤ 0.65 mm fine lead-pitch)	GQD144 ⁶ , GQD168 ^{5,6} , GQD196 ^{5,7} , GQD208 ^{5,6}

Notes:

1. All package versions are within JEDEC Metric standards unless otherwise noted.
2. These OPN package designators apply to commercial, proprietary product only. Package codes in OPNs for second-source products may differ depending on compatibility requirements with the proprietary source's OPN. For example, the OPN for the Am8038DX family of products uses an "NG" to denote a PQFP package instead of a "K" (e.g., NG80386DX-25).
3. Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket. Standard mil sizes per package leadcount are: 8 through 20 pin = 300 mil; 22 pin = 400 mil; 24 through 48 pin = 600 mil; 50 through 64 pin = 900 mil.
4. Not listed in MIL STD 1835.
5. Under development.
6. Metric package.
7. English package (measured in inches).
8. These packages consist of several ceramic layers laminated together to form the package base, and a metal lid is hermetically glass-sealed over the die cavity.

Packing Container Guide

	PACKAGE TYPE	PIN COUNT	DEVICE CARRIER	OPN DEVICE CARRIER CODE ¹	PACKING CONTAINER
P L A S T I C P A C K A G E S	Plastic Dual-InLine	All pin counts	Tube	none required	Mini-Q or 1Q box
	Plastic Leaded Chip Carrier	< 44 pins	Tube	none required	Mini-Q or 1Q box
					Dry Pack ^{2,3} & 2k/4k ⁶ box
		≥ 44 pins	Tape & Reel ²	\T	Dry Pack ^{2,3} & Reel box
			Tube	none required	Dry Pack & 2k/4k ⁶ box
			Tape & Reel ²	\T	Dry Pack & Reel box
			Tray ^{2,4,8}	\W	Dry Pack & Tray box
	Plastic Small Outline	All pin counts	Tube	none required	Mini-Q or 1Q box
					Dry Pack ^{2,3} & 2k/4k ⁶ box
			Tape & Reel ²	\T	Dry Pack ^{2,3} & Reel box
	Thin Plastic Small Outline	All pin counts	Tray ⁵	none required (Qty = 5 trays)	Dry Pack & Tray box
				\V ² (Qty = 1 full tray)	Dry Pack & Tray box
			Tape & Reel ²	\T ²	Dry Pack & Reel box
	Plastic Quad Flat Pack & Thin Plastic Quad Flat Pack	All pin counts in TapePak® (except PQT080)	Flat Tube ²	\F	Dry Pack & 2k/4k ⁶ box
			Coin-stack Tube ²	\S	Dry Pack & Tray box
		All pin counts trim/formed	Tray ⁵	\W (Qty = 5 full trays)	Dry Pack & Tray box
				\V ² (Qty = 1 full tray)	
		PQB 100, PQB 132, PQB 196	Jewel Box ²	\J ^{2,7} (Qty = 1 box)	Dry Pack & Tray box

Notes:

1. This coding system pertains to *new* AMD OPNs that were introduced after WW08, 1992. EXCEPTIONS to this are the one-tray (\V) carrier option for plastic quad flat pack (PQFP) and thin plastic small outline (TSOP) packages; tape & reel (\T) for TSOPs; and the jewel-box (J) for JEDEC English PQFPs. These special pack options will be filled on a **BUILD-TO-ORDER** basis only. Also, new OPNs for second-source product may or may not use this coding system depending on compatibility requirements with the proprietary source's OPN.
2. Optional; upon request only.
3. There is no OPN device carrier code for requesting dry pack protection when it is not done automatically, as it is for all product in PQFP and TSOP packages or PLCC packages ≥44-pins. When a customer wants dry packing for product in other IC packages, the request should be made via a DH or DS spec.
4. These trays can withstand temperatures up to 70°C.
5. These trays can withstand temperatures up to 155°C.
6. The 2K/4K boxes have been redesigned to include all the features of the Q-PACK box, including a protective ESD inner lining. These boxes will be used to ship these larger IC packages which cannot be accommodated in 1Q or mini-Q boxes.
7. The jewel box carrier, denoted by the \J suffix, is a new small increment pack option available for JEDEC English PQFPs.
8. Depending on demand, some lead counts may not be available in trays.

General comments:

In all cases, an individual pack (also known as blister pack) can be used upon request as the device carrier, and a \P should be used to designate this.

Packing Container Guide

	PACKAGE TYPE	PIN COUNT	DEVICE CARRIER	OPN DEVICE CARRIER CODE ¹	PACKING CONTAINER
H E R M E T I C P A C K A G E S	Hermetic Flat Pack	All pin counts except cerquads	Carrier in a Tube	none required	Mini-Q or 1Q box
		Cerquads (GQD 144 to 208)	Tray	\W	Tray box
	Ceramic Dual-In-Line	All pin counts	Tube	none required	Mini-Q or 1Q box
	Ceramic Leadless Chip Carrier	18 to 52 pins	Tube	none required	Mini-Q or 1Q box
		68 pins	Individual Pack	none required	2k/4k box ⁵
			Tube ²	\F	Mini-Q or 1Q box
		84 pins	Tray ³	none required	4k box ⁵
	Ceramic Pin Grid Array	84 pins	Carrier into a Tube	none required	2k/4k box ⁵
		132 pins	Naked in a Tube	none required	2k/4k box ⁵
			Carrier in a Tube ²	\F	2k/4k box ⁵
		All other pin counts	Carrier in a Tube	none required	2k/4k box ⁵
			Naked in a Tray ^{2, 4}	\W	Tray box
	Metal Can	8 to 10 pins	Carrier into a Bag ⁶	none required	Mini-Q or 1Q box

Notes:

1. This coding system pertains only to *new* AMD OPNs that were introduced after WW08, 1992. New OPNs for second-source product may or may not use this code depending on compatibility requirements with the proprietary source's OPN.
2. Optional; upon request only.
3. These trays can withstand temperatures up to 40°C.
4. These trays can withstand temperatures up to 50°C. They are available for all pin counts *except* 84 and 132 pins. They are also *not* available if the product requires a heat sink on the package.
5. The 2K/4K boxes have been redesigned to include all the features of the Q-PACK box, including a protective ESD inner lining. These boxes will be used to ship these larger IC packages which cannot be accommodated in 1Q or mini-Q boxes.
6. These are antistatic bags.

General comments:

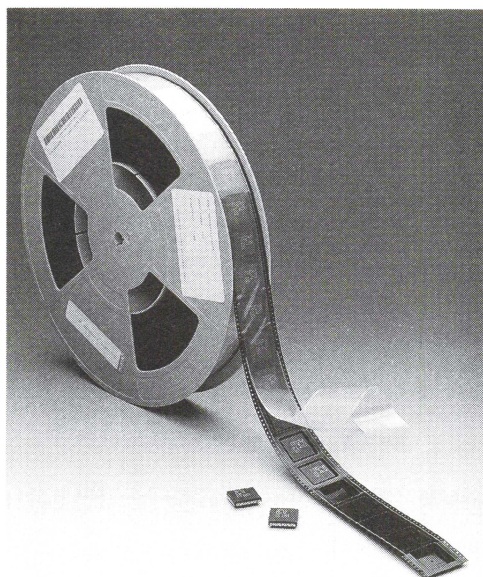
In all cases, an individual pack (also known as blister pack) can be used upon request as the device carrier, and a \P should be used to designate this.

Tape & Reel: Full Reel Quantity Information

Tape-and-reel device carriers are available for plastic leaded chip carrier, plastic small outline, and thin plastic small outline packages. This carrier is designed to protect product from mechanical and electrical damage, and it is suitable for device presentation to automatic pick-and-place equipment.

The tape-and-reel design consists of a pocketed carrier tape that is loaded with one device per pocket. Each device is oriented in the pocket so that its pin one location complies with the Engineering Industries Association Standard 481. A protective cover tape is heat-sealed over the carrier tape to keep the devices in the pockets. The reel is made of conductive polystyrene, and the cover tape is antistatic polyester—both of which protect product from ESD damage.

Once loaded, the tape is wound onto a plastic reel for packing and shipment. Each reel is labeled with a standard inventory label identifying the contents. A full reel holds a maximum quantity of devices depending on the package size, as shown in the table below. AMD encourages but does not require ordering in full reel quantities. Additional information on tape-and-reel containers and how they are packed for shipment is available in AMD's *Packaging Book* (PID# 12019C).



Devices are packed in pocketed tape and wound around a reel, allowing them to be fed into automatic board assembly equipment.

PACKAGE		PIN COUNT	QUANTITY PER REEL
Plastic Leaded Chip Carrier	PL	20 pins	1000
	PL	28 and 32 pins	750
	PL	44 and 52 pins	500
	PL	68 and 84 pins	250
Plastic Small Outline	SO	16 pins (150 mils)	2500
	SOH	16 (220 mils)	1800
	SO3	16 (300 mils)	1000
	SO	all other pin counts	1000
Thin Plastic Small Outline	TS TSR	32 pins	1500

Notes:

- 300 mm of empty trailer pockets are provided at the beginning of the reel to facilitate feeding the tape into automatic board assembly equipment.
- 500 mm of empty leader pockets are provided at the end of the reel.

Tray Device Carriers

Tray device carriers are more suitable than tubes for higher pin-count packages for which the fragile lead formations need added protection to preserve lead integrity and prevent mechanical damage. As a standard, the following packages are shipped in trays: thin small outline plastic packages (TSOPs), trimmed and formed plastic quad flat packs (PQFPs), thin PQFPs, and 84-pin ceramic leadless chip carriers. Trays also are available for other package types upon request. The table on the following page details the quantity of devices per tray and box for each package type.

AMD's tray designs comply with JEDEC outlines, including the new low profile (i.e., thinner by 37%) tray we are converting to for PQFP packages beginning in April 1993. For each package type, the outside dimensions of the tray are uniform across all pin counts. The tray design allows them to be stacked, affording greater packing density and helping optimize space utilization in the warehouse. Packages are loaded in trays so that the device pin-one is oriented to the notched corner of the tray.

The polyvinyl chloride (PVC) material of which the trays are made is capable of withstanding continuous operation at a variety of temperatures depending on the package style. These temperatures are noted in the "Packing Container Guide" on pages 5-11 and 5-12. The PVC material is carbon-filled or antistatically coated to provide ESD protection.

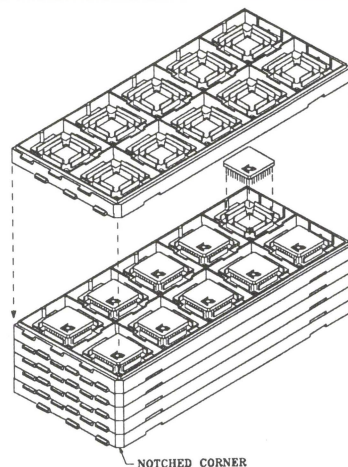


Figure 1.0
Packages are loaded in trays so that the device pin-one is oriented to the notched corner of the tray.

Packing Methodology

As standard practice, a stack of six trays are secured with straps; five contain parts and the sixth is empty to serve as a cover. The bound trays are put into an antistatic bubble pack bag, for extra-cushioning protection, and then into a quality-pack (Q-PACK™) tray box. (See page 5-17 for information on Q-PACK.) Product requiring dry pack protection is first sealed in

a moisture barrier bag with desiccant and a humidity-indicator card before being packed in the box. (See Figure 2.0). Upon customer request, one-tray pack increments are available for PQFP and TSOP packages, pending confirmation with your AMD sales representative relative to a specific device.

The tray box is a strong, corrugated cardboard design that has passed all international shipping stress tests. Each tray box is labeled with a standard inventory label identifying the box contents. Additional information about our trays and packing methods is available in AMD's *Packaging Book* (PID# 12019C).



Figure 2.0
Product requiring dry pack protection is put into an antistatic bag and then sealed in a dry pack bag before being packed into a tray box. Current tray boxes are top-opening only.

Tray Device Carriers: Full Tray Quantity Information

All Applicable Packages -- Tray and Box Quantities

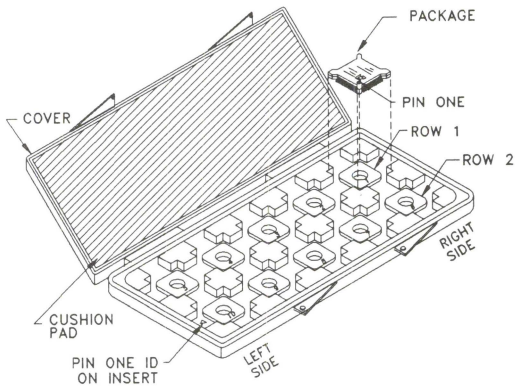
PACKAGE			PIN COUNT	DEVICES PER TRAY	TRAYS PER BOX ¹	DEVICES PER BOX
P L A S T I C	Plastic Leaded Chip Carriers	PL	44 pins	40	6	200
	Plastic Quad Flat Pack & Thin Plastic Quad Flat Pack	PQR ² , PQT ³	80 pins	66		330
		PQR	100 pins			
		PQB ⁴	100 pins	55		275
		PQR	120 pins	24		120
		PQB	132 pins	36		180
	Trimmed & Formed	PQR	144 pins	24		120
		PQR	160 pins			
		PQR	168 pins			
		PQB	196 pins	21		105
		PQR	208 pins	24		120
		PQR	216 pins			
	Thin Small Outline	TS, TSR	32 pins	156	6	780
H E R M E T I C	Ceramic Leadless Chip Carriers	CL	84 pins	42	6	210
	Ceramic Pin Grid Array	CGX, CGY, CGU, CGA, CGM	All pin counts except 84 and 132 pins ⁵	10	6	50
	Ceramic Quad Flat Pack	GQD ⁶	144, 168, & 208	24	6	120
		GQD ⁶	196 pins	21		105

Notes:

1. In all cases, the top tray is empty, serving as a cover.
2. PQR is AMD's internal package designator for a trimmed and formed JEDEC or EIAJ *Metric* package version.
3. PQT is AMD's internal package designator for a thin, trimmed and formed JEDEC *Metric* package version.
4. PQB is AMD's internal package designator for a trimmed and formed JEDEC *English* package version with bumpers.
5. Trays are only available for *non-heat sink* PGA packages with odd pin arrays (for example, "even" pin array, such as the 84- and 132-pin packages, are not available in trays).
6. These are the fine-pitch ceramic quad flat pack packages that are shipped in trays with the leads trimmed and formed in to a gull-wing design.

Jewel Box Carriers

The jewel box design concept was created to fulfill the need for smaller pack increments while providing the same high-quality protection for product during shipping and handling. Jewel box device carriers are available for all JEDEC English plastic quad flat pack packages (i.e., PQB 100, 132, and 196).



Dry Pack Protection

Moisture related package cracking can occur when plastic surface-mount product is mounted directly onto a board using a high-temperature solder reflow process (such as vapor phase or infrared). As the package is heated, moisture in the encapsulation material rapidly heats and vaporizes. This generates pressure within the package which can result in package cracking. Dry packing the product protects it from environmental moisture during shipping and handling, providing you with "solder-safe" packages.

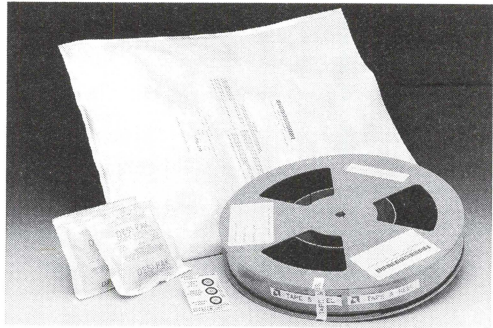
Our test results and industry studies show that below a 68-pin package size, the risk of moisture-induced package cracking is minimal. However, as a precautionary measure we dry pack all plastic leaded chip carrier packages ≥ 44 pins, all plastic quad flat packs (including thin PQFPs), and the 32-pin thin small outline plastic (TSOP) package.

The dry packing process begins with a 15-hour bake at 125°C, after electrical test, to remove any moisture build-up in the package. Product is then packed under a partial vacuum in a moisture barrier bag containing desiccant and a humidity indicator card. The bag interior is maintained at a safe relative humidity (RH) level of $\leq 30\%$. Once outside the bag (in a typical factory environment of 20° to 30°C and 50% to 70% RH), product should be board mounted within 72 hours. If this time is exceeded, or upon opening the

The jewel box is a uniform size for all three PQB pin counts. A custom-fit insert holds the units in place, providing mechanical protection and preserving lead integrity. Devices are placed in the jewel box so that the device pin-one location is uniformly oriented.

The jewel box materials protect product from electrical and mechanical damage. The box itself is a conductive, carbon-filled polypropylene; the cushion pad that fits inside the cover is dissipative black foam; and the insert is black, dissipative BPI-10 plastic.

Each jewel box is sealed in a dry pack bag (1 per bag) before packing it in a tray box, with as many as 3 jewel boxes per tray box. There are 10 devices per jewel box for the PQB 100- and 132-pin packages and 4 devices for the PQB 196 pin. Smaller quantities per jewel box also can be accommodated. Jewel box orders are filled on a **build-to-order** basis only. For information on jewel box availability for a specific device, contact your AMD sales representative.



Product is sealed in a moisture barrier bag with desiccant and a humidity indicator card.

bag the humidity indicator card registers pink, the product should be baked at 125°C for 24 hours. Product must be baked in *meta*/tubes—not the plastic tubes or reels in which it was shipped—or else a slower bake at 40°C for 192 hours at 5% RH should be done. Only the trays in which TSOPs and PQFPs are shipped can withstand up to 155°C.

When ordering product that is to be dry packed, AMD encourages but does not require ordering in full container quantities (be it tubes, reels, or trays). Additional information on the dry pack process is available in AMD's *Packaging Book* (PID# 12019C).

Quality-Packing Service

AMD's innovative quality-packing (Q-PACK™) service is applied to all product whether in tubes, trays, or reels. This means the product is packed and the boxes sealed right in our manufacturing area after final QA inspection.

The Q-PACK box design includes a conductive coating on the inner lining that forms a Faraday shield upon closure, protecting product from ESD damage. Q-PACK boxes are made of strong, corrugated cardboard, and they have passed all

international shipping stress tests, thereby protecting product from mechanical damage during shipping and handling.

Device quantities per carrier type and Q-PACK box are standardized per package type for all products. Ordering in full Q-PACK box quantities minimizes the need for distributors to repack our product and facilitates just-in-time deliveries. More information on our Q-PACK service is available in the *AMD's Packaging Book* (PID# 12019C).

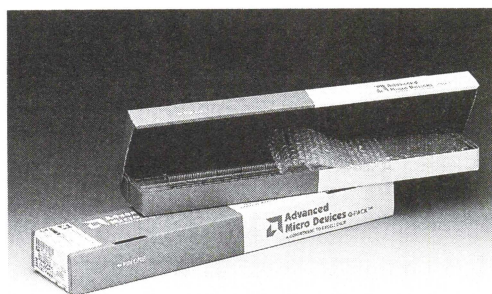


AMD's innovative Q-PACK service is used for packing all products, providing customers with factory-sealed quality product that has been handled a minimum number of times.

Tube Device Carriers

All of our tubes are made of antistatically coated polyvinyl chloride material which protects product from electrical and mechanical damage. Tube sizes are standardized by package type and pin count to facilitate automated board assembly. Devices are loaded into the tubes with each device pin-one uniformly oriented. The tubes are plugged with a variety of end-plug designs, all of antistatic material, that ensure there is no excessive movement of product within the tube during shipping and handling. Not only does this protect the integrity of the package leads, it ensures unimpaired dispensing of product for manufacturing operations.

The following pages detail the standardized "Tube and Box Quantities" that apply to product packed in tubes. The tube or box quantity does not change regardless of the Q-PACK box size, as there are several sizes used to achieve maximum packing density with a minimal amount of CFC-free bubble pack used to fill the excess space.



The Q-PACK tube boxes are conductively coated on the inner lining, creating a complete Faraday shield upon closure to protect product from ESD damage.

Ordering in full Q-PACK box quantities facilitates on-time deliveries and minimizes the need for distributors to repack our product. Additional information on our tubes, including their dimensions, is available in the *AMD's Packaging Book* (PID# 12019C).

Plastic Through-Hole Packages

PACKAGE		PIN COUNT	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Plastic Dual-in-Line	PD	8 pin (300 mils)	48	5	240
	PD	10 pins (300 mils)	30	8	
	PD	14-16 pin (300 mils)	24	10	
	PD	18 pins (300 mils)	20	12	
	PD	20 pins (300 mils)	16	15	
	PD	22 pins (400 mils)	15	16	
	PD3	22 pins (300 mils)			
	PD	24 pins (600 mils)			
	PD3	24 pins (300 mils)			
	PDW	24 pins (330 mils)			
	PD	28 pins (600 mils)	12	10	120
	PD3	28 pins (300 mils)			
	PDW	28 pins (330 mils)			
	PD4	28 pins (400 mils)			
	PD	32 pins (600 mils)	10	12	60
	PD	40 pin (600 mils)	8	15	
	PD	48 pin (600 mils)	6	10	
	PD	50 pin (900 mils)	6	5	30
	PD	52 pin (900 mils)			
	PD	64 pin (900 mils)	5	6	

Plastic Surface-Mount Packages

PACKAGE		PIN COUNT	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Plastic Leaded Chip Carriers	PL	20 pins, square	48	10 ¹	480 ¹
	PL, PLH	28 pins, square	30	16 ¹	
	PL	32 pins, rectangle			
	PL	44 pins, square	24	10	240
	PL	52 pins, square	20	12	
	PL	68 pins, square	16	15	
	PL, PLH	84 pins, square	15	16	
Plastic Small Outline	SO	16 pins (150 mils)	48	10	480
	SOH	16 pins (220 mils)			
	SO3	16 pins (300 mils)			
	SO	20 pins (300 mils)	30	16	
	SO	24 pins (300 mils)	24	20	
	SO	28 pins (300 mils)			
Plastic Quad Flat Pack	PQR, PQB	36-mm ring ²	12	10	120
	Flat Tubes	46-mm ring ³	10	12	
		56-mm ring ⁴	8	10	
	PQR, PQB	36-mm ring ²	60	3	180
	Coin-Stack Tubes	46-mm ring ³			
		56-mm ring ⁴	60	2	120

Notes:

1. If the customer requests that this product be dry packed, then these quantities are halved.
2. Includes PQR 080 and PQR 100.
3. Includes QQB 100, PQR 120, QQB 132, PQR 144, PQR 168, and PQR 216.
4. Includes QQB 196.

Hermetic Through-Hole Packages

PACKAGE		PIN COUNT	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Ceramic Dual-in-Line	CD	8 pins (300 mils)	48	5	240
	CD	14-16 pin (300 mils)	24	10	
	CD, CDV	18 & 20 pins (300 mils)	20	12	
	CD4, CD3	22 pins (all mils)	15	16	
	CD, CD3, CD4 CDV, CDE	24 pins (all mils)			
	CD, CDV CDE, CD4	28 pins (all mils)	12	10	120
	CD, CDV	32 pins (600 mils)	10	12	
	CD, CDV	40 pins (600 mils)	8	15	
	CDV	42 pins (600 mils)			
Side-Brazed Ceramic Dual-in-Line	SD	8 pins (300 mils)	30	8	240
	SD	14-16 pin (300 mils)	24	10	
	SD	18 pins (300 mils)	20	12	
	SD	20 pins (300 mils)	16	15	
	SD (SD4), SD3	22 pins (all mils)			
	SD, SDV	24 pins (600 mils)			
	SD3	24 pins (300 mils)	15	16	
	SD4, SD, SDV	28 pins (400/600 mils)	12	10	120
	SD, SDV	40 pins (600 mils)	8	15	
	SD	48 pins (600 mils)	6	10	60
	SD	50 pins (900 mils)	6	5	30
	SD6 (SD)	52 pins (600 mils)	6	10	60
Top-Brazed Ceramic Dual-In-Line	TD, TDX	52 pins (900 mils)	6	5	30
	TD, TDX	64 pins (900 mils)	5	6	

Hermetic Through-Hole Packages (continued)

PACKAGE		PIN COUNT	CARRIER SIZE	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Ceramic Pin Grid Array	CG, CGX, CGY, CGU	68 pins	2.75" x 2.75"	6	4	24 ¹
	CG	68 pins	2.00" x 2.00"	8	8	64 ¹
			no carrier	15	5	75 ¹
	CGU	69 pins	2.75" x 2.75"	6	4	24 ¹
	CGA	84 pins				
	CGU	85 pins				
	CGA, CGU	88 pins				
	CG, CGX	120 pins				
	CGX	132 pins	no carrier ³	8	6	48 ¹
			2.75" x 2.75"	6	4	24 ¹
	CG, CGX, CGY	145 pins	2.75" x 2.75"	6	4	24 ¹
	CG (CGH)	155 pins				
	CGM ²	168 pins				
	CG, CGX	169 pins				
Metal Can	MC, MCW	8 pins	0.75" x 1.00"	120	1 bag ⁴	120
	MC	10 pins				

Notes:

1. These quantities per box are for 2k boxes; they are double for 4k boxes.
2. CGM is a new package designator for a ceramic pin grid array with no heat sink, cavity down, large outline, and short pin lengths. Contact your AMD sales representative for more details.
3. Tubes are flat with inner rails, so device carriers are not required.
4. Metal can packages in carriers are packed in antistatic bags instead of tubes.

Hermetic Surface-Mount Packages

PACKAGE		PIN COUNT	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Ceramic Leadless Chip Carriers	CLR	18 pins, rectangle	48	10	480
	CL, CLT, CLP	20 pins, square			
	CLR	20 pins, rectangle	40	12	
	CLR	22 pins, rectangle	32	15	
	CLT	24 pins, square	40	12	
	CL, CLT, CLP	28 pins, square			
	CLR	28 pins, rectangle	30	16	
	CLR, CLV, CLH	32 pins, rectangle			
	CL, CLV, CLP, CLT	44 pins, square	24	10	240
	CL, CLT, CLW	52 pins, square			
	CL, CLT, CA2	68 pins, square	18	10	180

Hermetic Surface-Mount Packages (continued)

PACKAGE		PIN COUNT	CARRIER SIZE	DEVICES PER TUBE	TUBES PER BOX	DEVICES PER BOX
Ceramic Flat Packs	CF	10 pins	0.75" x 1.00"	15	8	120
	CF	14 pins (spider)				
	CF, CFB, CF4	16 pins				
	CF	18 pins (spider)				
	CFB, CF4	18 pins				
	CF, CF4, CFM CFL, CFB	20 pins				
	CF	22 pins (spider)				
	CFM, CFL, CFB	24 pins				
	CF	24 pins (spider)				
	CFQ	24 pins (quad)	1.25" x 1.25"	12	10	24
	CFM, CFB	28 pins, rectangle				
	CFT	28 pins, rectangle				
	CF	28 pins (spider)				
	CFT	42 pins, rectangle	1.56" x 1.61"	6	4	24
	CFT	44 pins (quad)	2.75" x 2.75"	8	3	
	CFT	48 pins, rectangle	2.00" x 2.00"	6	4	
	CFT	64 pins (quad)	2.00" x 2.00"	6	4	
	CFT	84 pins (quad)	2.75" x 2.75"	6	4	
	CTQ	164 pins (quad)	2.75" x 2.75"	6	4	

PUBLICATIONS FROM AMD

Publications From AMD

General Information

The following is a complete list of AMD's data sheets, data books, handbooks, technical manuals and catalogues. There is a brief description of each data book. The Part Number and Document Locator lists AMD devices by part number, and identifies by name, type, and literature order number the specific AMD publication (either a data sheet or a data book) containing technical information on devices listed.

How to Use the Part Number and Document Locator

All devices featured in this selector guide are arranged in numeric sequence. The Order Number column lists the literature order number for the device. The Publication/Type column identifies what data book or handbook the data sheet appears in, or if it's available as a standalone data sheet.

To order literature either call our toll free number (if available) or return the Publications Order Form included in this book. For data books, just check the box of the appropriate data book. For standalone data sheets or technical documentation, just write the literature order number in the spaces provided.

Sending of literature will be based on availability.

The right hand column, titled "Page Number," references the page number within the Selector Guide containing additional product information on a specific device.

Data Book/Handbook Descriptions

Am386® Microprocessors for Personal Computers

1993 Data Book 11339C

Contains data sheets on the Am386DX/DXL and Am386SX/SXL family of microprocessors.

Am7968/Am7969 TAXIchip Handbook

17240A

Contains final data sheet and a detailed technical manual providing information on using the TAXIchip set, clock generation and distribution, data encoding, interfacing, and board layout considerations.

Bus Interface Products

1991 Data Book 11128B

Contains data sheets on AMD's CMOS and bipolar Bus Interface family, products that increase integration and performance on the system level.

CMOS FIFO Memory Products 17238A
1992 Data Book/Handbook

Contains data sheets and application notes on AMD's bipolar and CMOS product offerings.

Data Acquisition Comparators/Converters

1989 Handbook 03762B

Contains 5 application notes and all data sheets for the complete family of voltage comparators and D/A and A/D converters.

Dynamic Memory Design

1991 Data Book 11580B

Contains complete and detailed memory system design information for industry standard microprocessors and buses. Also contains eight data sheets, four application notes and an article.

EPROM Products

1993/1994 Data Book/Handbook 17061A

Contains complete information on AMD's EPROM Memories including data sheets on CMOS EPROMs, low-voltage EPROMs, and ExpressROMs.

Ethernet/IEEE-803.2 Family

1992 Data Book/Handbook 14287B

A comprehensive handbook with data sheets for the LANCE chipset, our newest products for 10BASE-T, and information on the complete line of evaluation board products.

Flash Memory Products

1992/1993 Data Book/Handbook 11796B

Contains data sheets and application notes on 5-volt sector erase, 12-volt bulk erase, Flash memory PC cards, and an article on 100,000 cycle endurance.

MACH® 1 & 2 Family

1993 Data Book 14051G

Included in this book are a general discussion and final data sheets for the MACH 1 & 2 family members.

MACH® 3 & 4 Family

1993 Data Book 17466B

This book introduces you to the second generation MACH devices. Included are general discussions for MACH 3 & 4 family members as well as a final data sheet for the MACH435 and advance information for MACH355, MACH445, and MACH465.

PAL® Device

1993 Data Book and Design Guide 10173D

Contains a full line of data sheets representing AMD's low-power and high-performance CMOS PAL solutions as well as the industry's highest performing bipolar products.

The SUPERNET® Family for FDDI

1991/1992 Data Book 09734D

Contains a detailed overview and complete set of data sheets for AMD's FDDI system solution—the SUPERNET chip-set.

The SUPERNET®2 Family for FDDI

1991/1992 Data Book 15502B

Contains a detailed overview and data sheets for our highly integrated next generation FDDI solution.

Telecommunication Products

1992/1993 Data Book 12556B

Contains data sheets on AMD's complete line of SLIC, SLAC™ and DSLAC™ device analog linecard products as well as AMD's Am79C30A Digital Subscriber Controller™ device for use in terminal adapters and telephone systems.

3-Volt System Logic for Personal Computers

1993 Data Book 17028B

A comprehensive data book of AMD's low-voltage products. Includes 3-volt Am386 products, in addition to low voltage PAL, EPROM and SCSI devices.

Archive Literature**ARCHIVE**

Some documentation is not available for general distribution. These are designated as **ARCHIVE**. To order archived literature write "archive" next to the device number on the order form or if calling the toll free number ask for "Product Literature Archives."

General Literature

Packaging – Packages and Packing Methodologies
1992 Handbook 12019C

Quality and Reliability for the 1990s 09581B

Reliability – 1992 Data by Process Technology 09661E

Military Products Handbook
1993/1994 Edition 10640D

PCMCIA Training Manual 17515A

Manuals, Guides and Application Notes

Programmable Logic Devices

MACH Casebook

15592A

Application Notes:

MACH Applications Handbook

17020A

Reduce Chip Count Using PALCE29M16

12999A

Getting the most performance out of the PAL16R8-5/4 and PAL20R8-5 Series

15445A

Maximizing High-Speed Operation with Interleaved Ground and I/O Pins

15827A

Inside AMD's CMOS PLD Technology

16507A

High-Speed-Board Design Techniques

16356A

Designing with the PALCE16V8HD

16677A

Selecting the Correct CMOS PLD

17402A

Converting Bipolar PLD Designs to CMOS

17764A

Microprocessors and Related Peripherals

Am29000™ and Am29005™ 32-Bit Streamlined Instruction Processor

User's Manual and Data Sheet

16914A

Am29240™, Am29245™, and Am29243™ Microcontrollers

User's Manual and Data Sheet

17741C

29K Graphic Primitives Handbook

11011A

Am29027 Arithmetic Accelerator for the 29K Family Handbook

11852A

Am29030 and Am29035 Microprocessors User's Manual and Data Sheet

15723B

Am29050 Microprocessor User's Manual

14778A

Am29200 RISC Microcontroller User's Manual and Data Sheet

16362B

Am29000 Microprocessor Memory Design Handbook

10623C

Data Ciphering Processors Am9518, Am9568, AmZ8068 Technical Manual

04862B

Application Notes:

29K Family Applications Notes Book

16693A

Am29C300 Demonstration System

09856B

Am386*DXLV and Am386SXLV Microprocessors Implementing I/O Trapping in System Management Mode

17337A

Am386*SX-40 Microprocessor Competitive Analysis of Microprocessors

17336A

Minimization of Ground Bounce Through Output Edge-Rate Control (Bus Interface)

10181A

Am486™ System Management Mode

17927A

Networking and Communications Products

Am79168/Am79169 TAXI-275

Technical Manual

17490A

AmTAXI-275 Evaluation Board User's Manual

17757A

Am2100/Am1500T Network Driver Installation Guide

17922A

IEEE 802.3 Repeater Technical Manual

17314B

Am79C960 PCnet-ISA Technical Manual

16850B

ISA-HUB Evaluation Board

User's Guide and Reference Manual

17642A

Am79C30A/Am79C32A Low-Level Device Driver Reference Guide

10101B

Modem-Am79101, Am7910, Am7911 Technical Manual

09560C

SLIC/SLAC/DSLAC

Evaluation Board Manual

09539B

The SUPERNET Family for FDDI Technical Manual

09779A

Application Notes:

ISDN Systems Engineering

12557A

SLIC Switcher Circuit

13018A

Implementing Parallel Cyclic Redundancy Check (CRC) For Reliable High-Speed Point-to-Point Communication Using TAXI

12572A

TAXI Error Management

14229A

TAXIchip 4B/5B Codes

14170A

Driving NTSC Monitors Over Fiber Optic Links Using the TAXIchip Set

14299A

Extending HIPPI Links with Fiber Optics and the TAXIchip Set

15141A

FDDI on Copper with AMD PHY Components

15923A

Manual, Guides and Application Notes (continued)

Literature Order
Number

Application Notes (continued):

The Effect of Local Buffer Memory Size on FDDI Throughput	16294A
Board Layout Considerations for Am79865 and Am79866	16864A
A Low Cost 1 MB/s Network Using the Am7960	06846A

Article Reprints:

"Integrating Managed HUB and File Server Technologies"	17131A
"Multimedia over FDDI"	17386A
"LAN-ready PC Saves \$, Blood, Sweat, and Tears"	17463A
"SCSI – On Board or On Its Own?"	17537A
"Multimedia Works Well over Existing Network with Careful Design"	17691A
"Best Connectivity – AMD PCnet-ISA Chip"	17715A

Fusion Catalogs

Introduction

AMD's Fusion programs are partnerships between AMD and third-party vendors. AMD has established close engineering and marketing relationships with leading third-party vendors to provide users with the most affordable and highest-quality support program in the industry.

The program provides an opportunity for vendors who support various AMD products to showcase their products in a catalog published by AMD and distributed by AMD and its partners. It features AMD and industry-standard third-

party solutions including the application-specific solutions you need for successful system integration that can substantially shorten the time-to-market of your design.

The catalogs contain sections detailing silicon products, hardware and software development tools, operating systems, board products, system products, silicon support, test and programming equipment.

	Literature Order Number		Literature Order Number
FusionPCSM Catalog	17106A	Fusion29KSM Catalog	11426E
Time to Market Solutions for Am386 Microprocessor-based Designs		Partnerships for Application Solutions	
AMD's FusionPC program is a value-added support program providing development tools to help get your Am386 microprocessor-based design to market fast. The FusionPC program includes more than 200 products from over 50 suppliers with a wide range of products for 3-Volt component designs. Products range from chip-sets to displays and hard drives to plastic enclosures. Turnkey system design support is also available.		The Fusion29K program is a value-added support program providing designers a single, reliable source of AMD and third-party hardware and software development tools designed to help get a 29K Family-based application to market faster and at a lower cost. The Fusion29K program includes more than 230 tools from over 124 expert suppliers of embedded development solutions. Specific design solution chapters in the Fusion29K Catalog include: laser printers and OCR solutions, graphics solutions, and networking solutions.	
FusionPLDSM Catalog	14752C		
Design Support Tools for AMD's Programmable Logic			
AMD's FusionPLD program is a value-added support program providing timely PLD hardware and software design support of AMD PAL and MACH devices. The FusionPLD program integrates modular silicon-specific software solutions from AMD with popular third party software design packages.			
Many software companies are involved in the FusionPLD program. These partners are suppliers of well established PLD compilers, schematic capture software, programmers hardware and test vector generation packages. AMD's FusionPLD Catalog details these products.			

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AmC002AFLKA	17273	Standalone Data Sheet	2-18
AmC004AFLKA	17274	Standalone Data Sheet	2-18
AmC001BFLKA	17277	Standalone Data Sheet	2-18
AmC002BFLKA	17278	Standalone Data Sheet	2-18
AmFDDI-NET-2	15502	SUPERNET*2 Family for FDDI Data Book	4-9
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AmPAL18P8B/AL/A/L	10173	PAL* Device Data Book and Design Guide	1-6
AmPAL22P10A/B/AL	10173	PAL* Device Data Book and Design Guide	1-6
AmPAL22V10A	10173	PAL* Device Data Book and Design Guide	1-6
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Am27C080	17061	EPROM Products Data Book	2-13
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Am27LV010	17061, 17028	EPROM Products Data Book/3V Data Book	2-12
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Am27LV020	17061, 17028	EPROM Products Data Book/3V Data Book	2-12
Am27LV020B	17061, 17028	EPROM Products Data Book/3V Data Book	2-12
Am27X010	17061	EPROM Products Data Book	2-14
Am27C020	17061	EPROM Products Data Book	2-12
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Am27LS19	03209	ARCHIVE	2-4
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Am27S19A	03209	ARCHIVE	2-4
Am27S19SA	03209	ARCHIVE	2-4
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For instructions on how to order literature, see page 6-2.

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Am27S25	03300	ARCHIVE	2-5
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Am27C256	17061	EPROM Products Data Book	2-11
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Advanced Micro Devices, Inc. 901 Thompson Place, P.O. Box 3453, Sunnyvale, CA 94088, USA
Tel: (408) 732-2400 • TWX: 910-339-9280 • TELEX: 34-6306 • TOLL FREE: (800) 538-8450
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